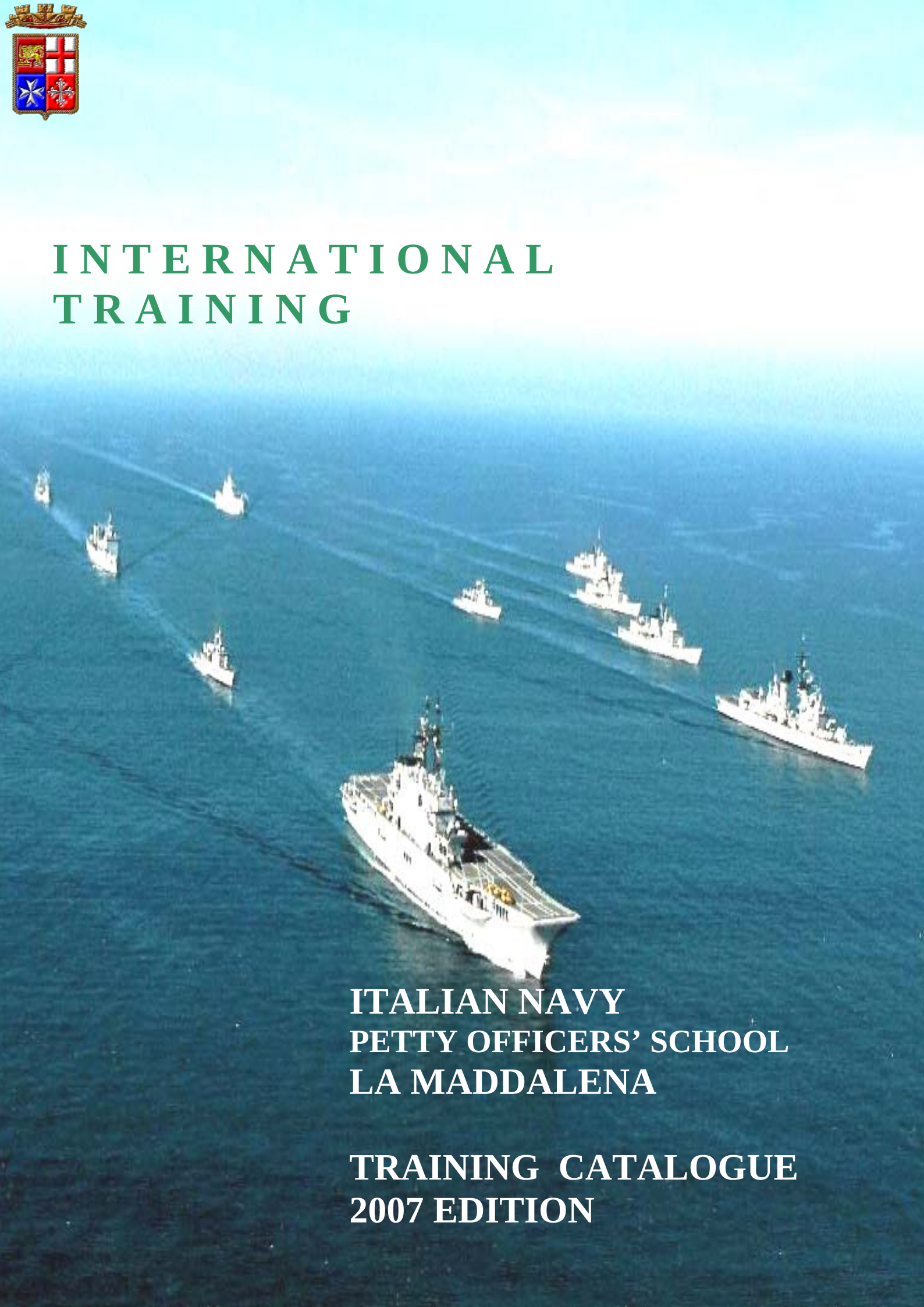
INTERNATIONAL TRAINING



ITALIAN NAVY
PETTY OFFICERS' SCHOOL
LA MADDALENA

TRAINING CATALOGUE
2007 EDITION

INTRODUCTION

THE TRAINING PLACE

ITALIAN NAVY

Petty Officers' School
La Maddalena

Contents

International Training (Italian Navy - Petty Officer's School La Maddalena)

INTRODUCTION

SHORT INTRODUCTION TO THE PETTY OFFICERS' SCHOOL OF LA MADDALENA

The school was inaugurated in 1949 with the name of "Gruppo Scuole C.E.M.M.".
The first regular courses taught were for the categories of Seamen, Signalmen, Secretaries, Cooks and Male Nurses
On May 17th 1957 the school was named after the Gold Medal of Honour recipient Lieutenant Colonel of the Engineering Corp, Domenico Bastianini, who honourably served his country during the World War II in the Eastern Mediterranean Sea. He lost his life after an explosion and the sinking of the Italian Cruise ZARA, where he was embarked.
From 1952 to 1960 there was a reorganization of the school that became a training centre for Naval Mechanics, Naval Motorists, Seamen, Deep-Sea Divers and Coast Guard Seamen.
Since 1982 the school has assumed the actual title of "Navy Petty Officers' School", subdivided in the formation elements of Study Director, Director of Petty Officers' Courses (now Director of Special Courses) and Director of Cadets' Courses (now Director of Operator's Courses).

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PURPOSE OF THE SCHOOL -
The school provides training and education for Navy Petty Officers, Sergeants and Volunteer Troops. It contributes to training personnel of the other Italian Armed Forces and Police Armed Forces as well as personnel of foreign Armed Forces.

INSTRUCTION
Personnel training is taught by instructors and teachers both civilian and military organized by the Study Director.
The teachers and civilian instructors are selected according to laws applying, as in other educational institution ie. high schools and university level schools. The military instructors are selected from Officers and Chief Petty Officers that have been certified by the Head Quarters of the Italian Navy.
The school is able to support 1000 cadets, with over 70 classrooms, from the traditional classrooms to specialists and the multimedia classrooms used for linguistic and computer science teaching.
The Machines, Engines, Naval Construction and Electrotechnical Teaching Departments avail themselves with laboratory and rooms such as Working Engine Room and a Dismantled Engine Room, assisted by the impressive Didactics Workshop that, in addition to the cadet training activity, is able to support with its specialized personnel various carpentry and metal working demands.

Working engine room disassembled and functioning engine room

Multimedial classroom

Video conference room

E/ELT Laboratory

INTRODUCTION

Seafaring art lessons; Nautical room and ECDIS (Electronic Chart Display Information System)

The Navigation and the Maritime Law Teaching Departments, for the sea activity necessary to achieve the professional certificate, avail themselves with motorboats, rubber boats and Coast Guard's Patrol Boats among them a ZODIAC H 920 last generation craft

As for physical activity, the School has an indoor swimming-pool, also used for life saving at sea training courses, nautical equipment sailing and rowing, and also a large modern multipurpose gym. There are also numerous outdoor sporting fields used for various team and individual activities.

TABLE OF CONTENTS

1. SEAMANSHIP

1.1 seamanship and boat work course

- course card
- syllabus

1.2 senior rating's seamanship course

- course card
- syllabus

1.3 command naval coastal unit qualification course for the coast guard

- course card
- syllabus

1.4 command naval coastal unit qualification course for other police/Armed forces

- course card
- syllabus

1.5 command naval offshore patrol units qualification course for other police/armed forces

- course card
- syllabus

1.6 command naval offshore patrol units qualification course, for petty officers with coastal qualification, of other police/armed forces

- course card
- syllabus

1.7 advanced course for personnel stationed on coastal patrol boats

- course card
- syllabus

2. MARINE ENGINEERING

2.1 hull, ship systems and diesel marine – maintainer basic course (first lower level)

- course card
- syllabus

TABLE OF CONTENTS

2. MARINE ENGINEERING

2.2 hull, ship systems and diesel marine – maintainer basic course (first upper level)

- course card
- syllabus

2.3 hull, ship systems and diesel marine – maintainer advanced course (ratings)

- course card
- syllabus

2.4 introductory course to operate endothermic engines up to 1000 HP on board of other police armed forces patrol vessels

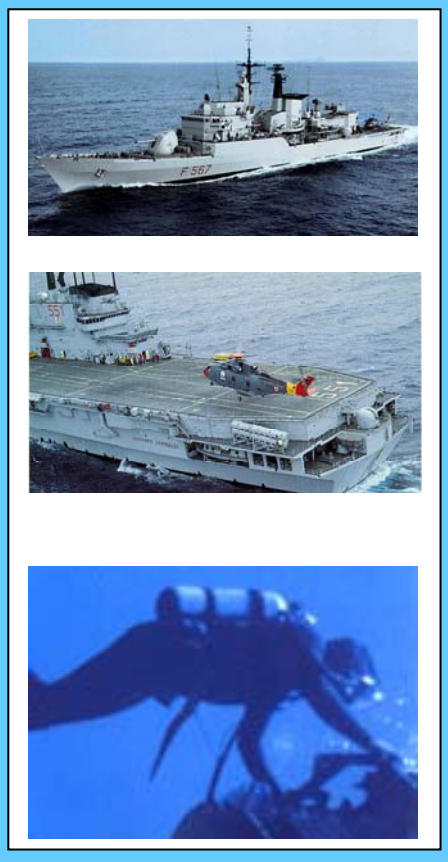
- course card
- syllabus

2.5 coast guard naval units engine management power up to 2400 Kw per shaft

- course card
- syllabus

2.6 introductory course for engine operators above 3500 Kw per shaft

- course card
- syllabus



1

SEAMANSHIP

Seamanship

SEAMANSHIP AND BOAT WORK COURSE

Reference No
1.1

Duration
16 weeks

Frequency
two courses per year

Course min/max number
Minimum 8

Accomodations
Board at school in barracks

Aim of course

To provide to seamanship basic knowledge and training in relation to the general operation on board an off shore patrol vessel and power boats and to enable to conduct power boats within 12 miles from the coast or mother-Navy ship.

Outline syllabus

- General seamanship knowledge and practice related the following main subject:
  - safety rules for handling wire and cordage, general rope work;
  - preparing and use rigging material;
  - maintain and use of anchors, cables and towing equipment;
  - maintain, prepare and use of replenishment at sea equipment;
  - maintain survival and safety equipment
- General knowledge about navigation, meteorology and communication at sea;
- Conducting of a power boat:
  - duties of Helmsmen and Bowmen of a power boat;
  - lifejackets and life rafts;
  - elementary first aid;
  - practice manoeuvres

Entry Standards

Intermediate school.

Examination

Practical, oral and written final examinations

Remarks

At the end of the course, participants will get a Certificate of Attendance.

Back to contents

1.1

SEAMANSHIP AND BOAT WORK COURSE - SYLLABUS

SUBJECT 1 of 6

BOAT HANDLING

1) THEORY

- Starboard and port side alongside mooring and unmooring manoeuvre
- Astern berthing manoeuvre with buoy retrieval
- Employ of painters and using the boat-hook
- Rules of steering and manoeuvre
- Using the life-jacket

2) BOAT HANDLING

- Alongside and astern mooring and leaving manoeuvres
- Conduct of boat in any weather conditions
- Mooring and unmooring assistance to other boats
- Assistance and towing of a disabled unit
- Sea training with towing boats
- Sea training with sailing boats
- Rules of the road at sea

SUBJECT 2 of 6

NAVAL CONSTRUCTION ELEMENTS, EQUIPMENTS AND MANOEUVRE (ECAM)

1) SHIPS

- General description of a ship
- Structure and compartmentation of the ships
- Ships' characteristics and qualities

2) SHIPS' AND BOATS' STEERING GEARS

- Rudder's general and its steering effects
- Propeller, variable pitch propeller

3) ANCHORS AND CHAINS

- Different types of anchors and description
- Kinds of chains and their maintenance
- Anchors and chains manoeuvre

4) BLOCKS, SNATCH-BLOCKS AND DIFFERENT TYPES OF TACKLES

- Characteristics of a block and a snatch-block
- Different types of tackles and their employment

5) REGULATIONS FOR PREVENTING COLLISIONS AT SEA

- General
- Steering and sailing rules
- Conduct of vessels in sight of one another
- Conduct of vessels in restricted visibility
- Characteristics of the seagoing lights
- Sound manoeuvring signals
- Action to avoid collision

Back to contents

6) ASSISTANCE AND RESCUE
- Fittings and rescue boats
- Man overboard (Williams and Boutakoff manoeuvring)

7) CAPSTAINS, WINDLASS, WINCHES
- Structure and their employment

8) GENERAL INFORMATION OF TOWING, MOORING AND UNMOORING OPERATIONS
- Towing manoeuvre
- Alongside mooring manoeuvre and use of the main lines
- Astern berthing manoeuvre with use of anchor or floating mooring buoy
- Mooring and unmooring assistance
- Anchor mooring; mooring post (swinging moorings)

9) SIGNS ABOUT REPLANISHMENT AT SEA OPERATIONS
- Replenishment of light cargo
- Methods used for fueling at sea

SUBJECT 3 of 6

ELEMENTARY FIRST AID

1) EVALUATION OF THE NEEDED TREATMENTS FOR INJURIES AND HEALTH

2) KNOWLEDGE OF THE HUMAN BODY AND ITS FUNCTIONS

3) COMPETENCE ABOUT ACTIONS TO TAKE IN CASE OF EMERGENCY, TO BE ABLE TO:
- Locate the accident
- Using the resuscitation techniques
- Action to take in case of haemorrage

4) LONG AND SHORT TERM LOSS OF CONSCIENCE

5) FIRST AID FOR INSUFFICIENT CARDIORESPIRATION
- Heimlick manoeuvre: cardiac massage and artificial respiration
- Coordination between artificial respiration and external cardiac massage
- Practical drill

6) HEAT EXHAUSTION AND HEATSTROKE
- Action to take on case of syndrome

7) BURNS
- Action to take on case of burn

8) ELECTROCUTION

9) VIOLENT INJURIES
- Open, closed and muscular injuries

10) FIRST AID FOR TRAMA VICTIMS
- Generality, bandaging, collecting, transport

11) DECOMPRESSION ILLNESS

12) PRACTICAL EXERCISE OF CARDIOPULMONARY RESUSCITATION (C.P.R.)

Back to contents

SUBJECT 4 of 6

PRACTICAL INSTRUCTION

1) ROPES AND TACKLES
- Rope definition and classification
- General requirements of the ropes
- Braking strain and safe working load

2) USING THE HEAVING LINE

3) RIGGING
- - practical use of main hitches

SUBJECT 5 of 6
NAVIGATION AND METEOROLOGY

NAVIGATION

1) BASES
- General information of:
  - Earth: Rotation axis, poles, main movements of the earth
  - Circles: great circles, minor circles, meridians, parallels, equator, latitude, longitude, mile, knot

2) SENSE OF DIRECTION
- Horizon – Cardinal points – Compass card, Main winds – Course – Route
- True bearing, polar bearing

3) GEOGRAPHICAL REPRESENTATION
- Nautical charts
- Reduction scale of the charts
- Mercator's projection
- Information reported on the charts

4) DEAD RECKONING NAVIGATION
- Dead reckoning navigation problems
- Graphic solution of the basic problems
- Relation between space, speed and time (mathematic formula space= speed x time)
- Using of nautical table nr. 1
- Magnetic field of the earth
- Magnetic declination and deviation
- Formulas to convert compass course in true course and vice versa
- Instruments used to measure course and speed (compass, logs, sounder)
- Effect of the stream, wind and sea (drift and leeway)

5) COASTAL NAVIGATION (PILOTAGE)
- Coastal navigation and place of position definition
- Lines of position used and instruments used to determine them
- Determining the fix using the lines of position
- Pilot book

6) MARITIME SIGNAL
- Signs about characteristics of lighted signals
- List of lights and sound signals

7) PLOTTING EXERCISES

Back to contents

METEOROLOGY

1) ATMOSPHERE
- General
- atmospheric energy
- temperature
- Instruments used for measuring the temperature

2) ATMOSPHERIC PRESSURE
- Pressure and instruments used for its measurement

3) HUMIDITY
- Humidity and instruments used for its measurement

4) CLOUDS AND RAIN
- Cloud formation
- Kinds of clouds

5) WIND
- Origins and characteristics
- Cyclon and anticyclon
- General circulation of the atmosphere
- Instruments used for measuring the wind
- Weather forecast

SUBJECT 6 of 6

COMMUNICATION

1) INTERNATIONAL SIGNALS CODE
- Common definitions and general information about the International Signals Code
- Content and using of the appendix
- Distress signals
- Signs about communication with use of flags

2) RADIO APPARATUS VHF/FM

3) GENERAL RADIOTELEPHONE PROCEDURES
- Frequencies /call channels/ rescue channel and work channel in the maritime mobile service.
- Priority order in the communication. Silence periods/listening in order of the used frequency
- Call signs, identification calling (purpose, composition and assignment)-
- RTF procedures provided from International Signals Code

4) RESCUE GENERAL PROCEDURE
- Rescue organization; International radiophone rescue communication (distress signal, call, rescue message, receipt, etc)
- Urgency and Security procedures

Back to contents

Seamanship

SENIOR RATINGS' SEAMANSHIP COURSE

Reference No
1.2

Duration
11 weeks

Frequency
one course per year

Course min/max number
Minimum 8

Accomodations
Board at school in barracks

Aim of course

To train petty officer seamen to first control level supervising and operate power boats further than 12 miles from the coast or mother-Navy ship

Outline syllabus

- Navigation and meteorology
- Naval construction
- Communication
- Maritime laws
- Use of Personal Computer

Entry Standards

- Must have completed the basic seamanship and boatwork course.
- Must have an appropriate experience on job training at sea-going ships

Examination

Written and practical final exam on the training subjects.

Remarks

At the end of the course, participants will get a Certificate of Attendance.

Post course recommendations

Ideally a period in a sea-going ship to consolidate the knowledge and skills obtained during the course.

Back to contents

1.2

SENIOR RATING'S SEAMANSHIP COURSE - SYLLABUS

SUBJECT 1 of 5

NAVIGATION

1) GENERAL

- Geographic coordinates, mile and knot, direction and measure systems. Marine horizon and compass card.
- Great circle navigation, rhumb line navigation and Mercator's projection. Gnomonic projection, nautical plans and reduction scale.
- Zone time and Nautical Almanac (times of sunrise and sunset)

2) DEAD RECKONING NAVIGATION

- Precision of dead reckoning navigation
- Instruments used for dead reckoning navigation (compass, gyrocompass and log)
- Wind
- Current
- Using the Nautical Tables
- Systems to indicate a geographic position

3) COASTAL NAVIGATION (PILOTAGE)

- General
- Lines of position
- Determining the fix using two or more simultaneous lines of position
- Determining the fix using lines of position not simultaneous (shifting)
- Sailing direction and its employ
- Rules and symbols used to plot
- Instruments used for pilotage (pelorus, sextant, station pointer etc)
- Radar

4) MARITIME SIGNALS

- Luminous and geographic range, sectors of the lighting signals
- Type of light, period and characteristic
- List of lights and its employ
- AISM and IALA systems
- Symbols used on the charts

5) USING THE NAUTICAL DOCUMENTS

- Updating the Nautical Documents
- Notice for mariners
- Radio aids to navigation
- Log book

6) RADIONAVIGATION

- GPS
- Practical use of GPS
- Charts
- Radio direction finder

7) BASIS ASTRONOMY

- Recognition of Polar star
- General information about measuring the height of the celestial bodies
- Using the sextant and the Nautical Almanac

8) PLOTTING EXERCISES

Back to contents

9) METEOROLOGY
- The atmosphere
- The temperature
- The atmospheric pressure
- The atmospheric humidity
- The wind
- Clouds and fog classification

10) WEATHER EFFECTS
- State of the sea and waves
- The effect of wind and sea on small craft

11) WEATHER FORECASTING PRINCIPLES
- Synoptic study of weather
- Front method
- Types of fronts

12) METEO MESSAGES – RADIO WARNING – GALE'S OPTICAL SIGNALS
- Meteorological organization
- Meteo messages
- Gale warning and optical signals

13) WEATHER FORECAST
- Interpretation of:
  – meteomar
  – actual surface
  – meteo maps
  – mufax

SUBJECT 2 of 5

NAVAL CONSTRUCTION

A) THEORY

1) SHIPS
- Recalls about:
  – General nomenclature of a ship
  – classification of ships
  – structure and compartmentation of ships
  – characteristics and qualities of a ship

2) SHIP'S STABILITY
- Archimede's principle
- Freeboard, reserve of buoyancy
- Load-line grid
- Load-line circle
- Balance conditions of fully dipped bodies
- Balance conditions of partially dipped bodies
- Tons per inch immersion
- General information about transversal static stability

3) RUDDER AND PROPELLER
- Detailed study about:
  – rudder
  – propeller
  – propeller's effects

Back to contents

– manoeuvrability of a single screw ship and twin-screw
– variable pitch propeller

4) RULES OF THE ROAD
- General
- Steering and sailing rules
- Conduct of vessels in sight of one another
- Conduct of vessels in restricted visibility
- Lights and shapes
- Sound and lights signal
- Exemptions
- Positioning and technical details of the lights
- Additional signals for fishing vessels
- Distress signals
- Signals used by the Navy Ships

B) PRACTICE

1) STOWAGE OF CARGO
- Recalling about:
  – stowage operations
  – gripes operations
  – dangerous goods
  – ballasting

2) SHIP'S RIGGING
- Detailed study on:
  – hardware
  – anchors
  – chains
  – capstans
  – winches
  – windlass

3) MOORING AND ANCHORING
- Recalling about:
  – Mooring and unmooring manoeuvres
  – Manoeuvre to securing to buoy and leaving
  – Theory to moor with a single anchor
  – Ship at anchor in bad weather

4) NAVIGATION WITH BAD WEATHER
- Very rough sea – Driving in head, beam and following seas
  – using the floating anchor
  – changing engine revolutions to ensure slow speed ahead in very rough sea

5) ASSISTANCE AND RESCUE
- detailed study of rescue fittings

6) RECALLING / UPDATING ABOUT ALL TYPES OF REPLENISHMENT AT SEA USED BY NAVY SHIPS

8) WORKING WITH RIGGINGS
- Splices, tying, and different kind of Knots

9) ROPE SYSTEMS
- Different types of rope systems and their employ

10) PRACTICAL MANOEUVRE ON BOARD SMALL CRAFTS AND TUGS
- Rudder effects

Back to contents

- Manoeuvrability of a single or twin-screw ship in ahead and astern steering

11) SAIL PROPULSION (PRACTICAL SAILING)
- To luff and to bear up, definition of tacks
- Broad, reach, abeam, beam reach, close-hauled, close reach, stern wind, down wind
- Manoeuvre to retrive a buoy
- Anchoring and mooring
- Sailing manoeuvring in restricted area

12) ANCHORS AND CHAINS – ANCHORING (on board of ships)
- Fitting, preparing and manoeuvre of the anchors
- Manoeuvre to drop and heave up two anchors using a single capstan
- Rounding of the cable chains
- Turnbuckle, slip stopper
- Precauction to take to drop the anchor in high depth
- To drop a kedge -anchor

13) MOORING
- Mooring and unmooring manoeuvres
- Manoeuvre to retrive and leave a buoy
- Drop and heave up of a mooring post for craft

14) TOWING
- Offshore towing
- Towing in the port
- Boat towing

15) ASSISTANCE AND RESCUE
- Man overboard manoeuvres
- Salvaging of shipwrecked persons
- Lowering of life boat

16) PRACTICAL EXERCISES OF CHAIR-LIFT, LIGHT CARGO TRANSHIPMENT/REPLENISHMENT AT SEA

SUBJECT 3 of 5

COMMUNICATION

1) INTERNATIONAL CODE OF SIGNALS
- Definition of: Base group, numerical complement, procedure signal
- Sender, addressee, transmitting and receiving stations
- Purpose and structure of the International Code of Signal, including appendix and MERSAR (schemes of research)
- Signal coding and decoding
- Communication with use of flags

2) RADIOTELEPHONE PROCEDURE
- International call signs and their issuing
- Basic outline of the message; frequencies of calling and rescue
- Preliminary and ordinary call
- Using the CORRECTION; RPT together groups AA; AB; WA; WB; BN
- Rescue procedure (standard messages)
- Urgency
- Security
- Practice exercises

Back to contents

3) APPARATUS AND PROPAGATION OF THE RADIO WAVES
- Description of VHF/FM radio apparatus
- Antennas and their employ

4) SPECIAL SIGNALS AND PROCEDURES
- Using the flag “PREP”
- Using the flags to identify specific task unit
- Replenishment at sea
- Command banners
- Content and use of the Radio Aids to navigation

SUBJECT 4 of 5

SIGNS OF MARITIME LAWS

1) YACHTING
- General information concerning Italian yachting laws
- Obligation, authority and duties of the captain

2) LIFE SAVING EQUIPMENTS

3) MARITIME AUTHORITY
- Authority to promulgate a law
- Documents to keep on board

4) PRECAUTION TO ADOPT DURING NEAR COAST SAILING

5) NAUTICAL SKIING

6) RENT OF YACHT OR SMALL BOAT

7) ACCIDENT AND ABANDON SHIP

8) ASSISTANCE AND RESCUE
- medicine box
- distress signals and their meaning

SUBJECT 5 of 5

USE OF THE PERSONAL COMPUTER

1) PC COMPONENTS

2) FILES, DISKS, INDEX, PROGRAMS AND DATA

3) WINDOWS
- Basic concepts
- Desktop, windows and icons
- Applications, program manager and file manager
- Accessories
- Notes
- The control panel
- Guide and user’s manual

4) PROGRAMS USED BY ITALIAN NAVY
- Basic concepts
- Texts elaborator
- The electronic sheet

Back to contents

5) EXERCISES TO ELABORATE TEXTS

Back to contents

Seamanship

COMMAND NAVAL COASTAL UNIT QUALIFICATION COURSE FOR THE COAST GUARD

Reference No
1.3

Duration
6 weeks

Frequency
One course per year

Course min/max number
Minimum 8
Maximum 24

Accomodations
Board at school in barracks

Aim of course

To assume the command of coastal naval units in navigation within 20 miles radius of the coast.

Outline syllabus

Subjects

- Ship handling
- Exercises using nautical maps
- Maritime Laws
- Radar
- Electronic and radio apparatus aboard
- Life saving at sea
- Elementary First Aid
- Conferences

Entry standards

- Must have successfully completed a course, as a Petty Officer, about the following subject: navigation, meteorology, line procedures and manoeuvring.
- Must have worked on board naval units for at least one year.
- Medical visit required before “life saving at sea” course.

Examination

Practical and/or written final exam on the subjects indicated above.

Remarks

At the end of the course, participants will get a Certificate of Attendance.

Back to contents

1.3

COMMAND NAVAL COASTAL UNIT QUALIFICATION COURSE FOR THE COAST GUARD – SYLLABUS

SUBJECT 1 of 8

SHIP HANDLING – Hours 72

1) KNOWLEDGE OF THE EMPLOYED UNIT
- Type of unit and use
- Hull and propulsion
- Engine
- Control systems
- Fittings (firefighting, anti leak, salvage and rescue)
- Trim

2) SHIP HANDLING
- Navigation's order
- Manoeuvre for mooring alongside
- Manoeuvre for moooring astern
- Buoy mooring
- Manoeuvre for mooring alongside simulating steering systems failure
- Manoeuvring beside another vessel
- Manoeuvre of towing
- Manoeuvring - Mooring with a towed vessel
- Dropping anchor at a fixed point
- Simulation of emergency manoeuvre of chain release
- Man overboard
- Planning of the navigation
- Plotting during pilotage
- Planning of Search and Rescue operations (areas and schemes)

SUBJECT 2 of 8

EXERCISES USING NAUTICAL CHARTS – Hours 12

1) PLOTTING EXERCISES RELATING TO SEARCH AND RESCUE OPERATIONS
- Planning, search area and schemes considering weather conditions in the zone

2) ANALYSIS OF ALL THE PROBLEMS AND EVENTS THAT OCCURRED DURING NAVIGATION

SUBJECT 3 of 8

MARITIME LAWS – Hours 36

1) ORGANIZATION OF ITALIAN COAST GUARD NAVAL SERVICE
- Italian Coast Guard Central organization
- Peripherical organization
- Command and control chain

2) RESPONSABILITIES OF THE COMMANDING OFFICER

Back to contents

- Obbligations connected to navigating a vessel
- Obbligations of crew management
- Obbligation of ship use
- Change of command aboard a patrol craft
- Operation orders and mission reports
- Rules concerning the use and the custody of the weapons
- Damage report and defrief of the ship's hull
- Insurance of the patrol boat
- Personnel other than actual crew on board
- Deeds and procedures concerning accidents
- Regulations concerning clandestine immigration **(Dlgs. 25/7/1998 n° 286 and DPCM 12/5/1999)**

3) SHIP'S DOCUMENTS, UPDATING AND CUSTODY

4) TRAINING ACTIVITY

- General rules, documents and responsibility in order of:
  - Weekly drills
  - Monthly drills
  - Quarterly drills
  - Six-monthly drills
  - Annual drills
  - Occasional drills

5) WORK ON THE UNITS

- Work carried out in the shipyard with ship turned over to shipyard organization
- Work executed by external contractors without turn over of the ship to shipyard
- Evaluation and selection of bid
- Control of work

SUBJECT 4 of 8

RADAR – Hours 18

1) PRINCIPLES OF OPERATION AND CONSTITUTION OF A RADAR

- Transmission of impulses
- Power, duration and frequency of the impulse
- Radar coverage (minimum and geografic)
- Radar on S and X band
- Long distance resolution
- Azimuth resolution
- Nautical radar blocks scheme

2) OPERATIONAL EMPLOYMENT OF THE NAUTICAL RADAR

- Employment of the S.T.C. (clutter sea) and F.T.C. (clutter rain)
- Recognition of false echoes
- Active and passive responses
- Various types of radar representation (bow aloft, motion aloft, true motion)
- Determination of the kinematics elements to avoid the collision (distance to the point of maximum approach) CPA, time to CPA, manoeuvres to pass to one determined distance, route of maximum approach, determination of the route and speed of the target
- Using the radar in navigation, landing and anchoring
- Rules of radar maintenance (use of operational manual when searching for damages)
- Precautions to take in proximity of the antennas and the guides of wave opened
- Periodic check of the radar's performances under conditions of good visibility

Back to contents

SUBJECT 5 of 8

ELECTRONIC AND RADIO APPARATUS ABOARD – Hours 24

1) FRONT END OF THE APPARATUS BEING USED
- Frequencies used by the Italian Coast Guard
- Schedules of listening
- VHF/AM
- VHF/FM (fixed and portable postings)
- HF/SSB
- RDG (VHF)
- CB
- GPS
- Meteo fax
- Navtex
- Sounding lead
- S.A.R.E. updating

2) MAINTENANCE APPARATUS
- Cleaning and minor maintenance of the apparatus
- Antenna's maintenance
- Controlling of earth braids
- Cleaning of the ship's hull (grounding installation)
- Periodical maintenance to the batteries

SUBJECT 6 of 8

LIFE SAVING AT SEA – Hours 24

1) BASIC SWIMMING TRAINING EXERCISES

2) TEACHING OF THE UNDERWATER SWIMMING

3) SWIMMING FOR LIFE SAVING
- Precarious approaching
- Precarious carriage

SUBJECT 7 of 8

ELEMENTARY FIRST AID – Hours 18

1) GENERAL INFORMATION OF ANATOMY AND PHYSIOLOGICAL CARDIORESPIRATION

2) INSUFFICIENT CARDIORESPIRATION
- Shock

3) ACUTE INSUFFICIENT RESPIRATION
- Drowning and suffocation caused by foreign objects

4) LONG AND SHORT TERM LOSS OF COSCIENCE

5) FIRST AID FOR INSUFFICIENT CARDIORESPIRATION
- Heimlick manoeuvre: cardiac massage and artificial respiration
- Coordination between artificial respiration and external cardiac massage
- Practical exercise of cardiopulmonary resuscitation (C.P.R.)

6) HEAT EXHAUSTION AND HEATSTROKE

Back to contents

7) BURNS

8) ELECTROCUTION

9) VIOLENT INJURIES
- Open, closed and muscular injuries

10) FIRST AID FOR TRAMA VICTIMS
- Generality, bandaging, collecting, transport

11) DECOMPRESSION ILLNESS

SUBJECT 8 OF 8

CONFERENCES – Hours 6

1) MATERIAL MANAGEMENT AND ADMISTRATIVE PROCEDURES

Back to contents

Seamanship

COMMAND NAVAL COASTAL UNIT QUALIFICATION COURSE FOR OTHER POLICE/ ARMED FORCES

Reference No
1.4

Duration
12 weeks

Frequency
One course per year

Course min/max number
Minimum 8
Maximum 24

Accomodations
Board at school in barracks

Back to contents

Aim of course

To assume the command of coastal naval units in navigation within 20 miles radius of the coast.

Outline syllabus

Subjects

- Ship handling
- Navigation and Meteorology
- Maritime laws
- Naval construction
- Communication (Radio Apparatus)
- Line procedures

Entry Standards

Capable to swim

Examination

Practical and/or written final exam on the subjects indicated above.

Remarks

At the end of the course, participants will get Certificate of Attendance.

1.4

COMMAND COAST NAVAL UNIT QUALIFICATION COURSE FOR OTHER POLICE/ARMED FORCES - SYLLABUS

SUBJECT 1 OF 6

SHIP HANDLING – Hours 110

1) KNOWLEDGE OF THE EMPLOYED UNIT

2) FEATURES OF UNIT
- Effects on the stability and on behaviour at sea, at loading, discharging and shifting of weights on board

3) MANOEUVRE
- Practical knowledge and use of remote control
- Mooring (alongside, astern) and unmooring manoeuvre
- Buoy mooring

4) COURSE ALTERING AND EVOLUTION PROOF

5) MANOEUVRING BESIDE ANOTHER VESSEL

6) TOWING OF SMALL CRAFT

7) PRACTICAL APPLICATION OF NAVAL CONSTRUCTION ELEMENTS, EQUIPMENTS AND MANOEUVRE (ECAM) , NAUTICAL AND METEO SUBJECTS

8) USING OF THE AUXILIARY EQUIPMENTS OF NAVIGATION

9) PRACTICE DEVELOPMENT OF SEARCH AND RESCUE ACTIVITY

SUBJECT 2 OF 6

NAUTICAL / METEOROLOGY – Hours 88

NAUTICAL

1) PRELIMINARY ELEMENTS
- Earth: rotation axis, poles, main movements of the earth
- Circles: Great circles, minor circles, meridians, parallels, equator
- Latitude, Longitude, Mile, Knot
- Mile; formula to convert from mile to Kilometers and vice versa
- Knot; formula to convert from Mt/s in Knots and vice versa
- Using of Nautical Table n°30 e n° 31

2) SENSE OF DIRECTION
- Horizon, Azimuth, cardinal points, compass card, main winds
- Course, route, considerations about course and route, great circle navigation, rhumb line navigation, choice of the track
- True bearing, polar bearing; formula to convert bearings

3) GEOGRAPHICAL REPRESENTATION
- Nautical charts properties, reduction scale, Mercator's projection chart
- Gnomonic projection and Nautical plain
- Information on the charts
- General information of electronic cartography

Back ho contents

4) DEAD RECKONING NAVIGATION

- Dead reckoning navigational problem
- Graphic solution of basic problems
- Instruments used to measure course and speed
- Use of nautical table nr. 1
- Magnetic field of the earth
- Magnetic variation and deviation
- Formulas to convert true course in compass course and vice versa
- Exercises to convert compass course in true course and vice versa
- Compensation and deviation tables
- Effect of the stream, wind and sea (drift and leeway)
- Graphic solution of drift problems
- Graphic solution of leeway problems
- Errors of the dead reckoning navigation

5) COASTAL NAVIGATION (PILOTAGE)

- General information
- Line of position of equal azimuth
- Systems for bearing measurement
- Formulas to convert true bearing in compass bearing and vice versa with practical exercises
- Formulas to convert a relative bearing in true bearing
- Instruments used for determining a position line of equal azimuth
- Line of position of equal difference of azimuth and alignment
- Instruments used to determine the position line of equal difference of azimuth
- Position line of equal distance, instrument used for measuring it (radar)
- Position line of equal depth, instrument used for measuring it (echo sounder)
- Fix with two or three position lines
- Fix obtained using two bearings of the same object taken in two different times

6) MARITIME SIGNAL

- Classification of the maritime signals
- Characteristics and sectors of the lighting signals
- Sound and radioelectrical signals
- Description and use of List of light and radio aids to navigation
- Nominal, luminous and geographic range of the lighting signals and exercises with use of nautical tables n. 6 and 7
- Maritime signals system AISM/IALA and their symbol on the charts
- Sighting of light signal (deploying to sea at night)

7) VARIOUS

- Pilots, Nautical tables and Catalogues
- Systematic and occasional updating of the nautical documents; notice of mariners
- Description of the system W.W.N.W.S. and NAVAREA notices
- General information of GPS

8) PLOTTING PRACTICE

- Plotting rules
- Plotting exercises

METEOROLOGY

1) BASIS

- Purpose of the Meteorology
- Atmosphere: its composition, nomenclature and characteristics of the stratus

2) TEMPERATURE

- Introduction, propagation and absorption of the radiation
- Vertical trend of the temperature
- Isotherm

Back to contents

- Temperature range
- Temperature measurement. Thermometric scale, air temperature measurement
- Use of nautical tables nr. 27, 28 and 29
- Instruments used for measuring the temperature

3) ATMOSPHERIC PRESSURE
- Measure of atmospheric pressure; unit of measurement
- Instruments used for measuring the pressure
- Corrections to mercury barometer measurement
- Use of nautical tables nr. 13a, 13b and 13c
- Isobars and isobaric patterns
- Variation of pressure
- Barometric tendency
- Topography of an isobar surface

4) ATMOSPHERIC HUMIDITY
- Steam in the atmosphere
- Absolute, specification and relative humidity
- Dewpoint
- Using of nautical table nr. 14
- Instruments used for measuring humidity

5) THE WINDS
- Introduction: forces that generate winds
- Wind classifications
- Stau and Fohen
- Instruments used for measuring the wind
- Use of nautical tables nr. 15 and 16

6) STATE OF THE SEA AND WAVE MOTION
- Waves and state of the sea
- State of sea scale

7) CONDENSATION AND RAINS
- Introduction: clouds classification
- Cloudiness
- Fog formation and classification (fog, mist and cloud over meteo)
- The meteo due to condensation

8) PRINCIPLES FOR WEATHER FORECASTING
- General information about it

9) AIR MASSES AND FRONTS
- Air masses
- Fronts and their development
- Warm front
- Cold front
- Occluded front

10) METEO SERVICE
- World Meteorological Organization
- Italian meteorological service

11) ORIGIN OF METEOROLOGIC INFORMATION – WEATHER FORECAST AND GRAFIC REPRESENTATION'S INTERPRETATION
- Sources of meteorological information
- Meteo information in clear
- Meteo information in numerical code or mixed
- Facsimile's graphic representation

Back to contents

- Most common weather forecast and graphic representations (METEOMAR, FLEET FORECAST, SYNOP, etc)
- Gale warning advise

SUBJECT 3 OF 6

NAVAL CONSTRUCTION ELEMENTS, EQUIPMENTS AND MANOEUVRE (ECAM) – Hours 44

1) SHIP'S INFORMATION
- Structure and compartmentation of a ship
- Ship's characteristics and qualities
- Nomenclature and definitions, main dimensions

2) SHIP'S EQUIPMENTS
- Ropes
- Blocks
- Ropes systems
- Anchors
- Chains
- Windlass
- Winches
- Capstan
- Rudder
- Propeller/screw

3) BOATS AND THEIR MANOUEVRING
- General information about the unit
- Life saving appliances (life boat, life raft) and board equipments
- Towing of small craft

4) MOORING AND ANCHORING
- Different kinds of mooring and anchoring
- Anchors and chains manoeuvring

5) RULES OF THE ROAD

SUBJECT 4 OF 6

MARITIME LAW – Hours 22

1) LEGAL STATUS OF THE SEA
- Subdivision of the sea areas
- Territorial sea and internal sea waters; legal status of the ships in those areas
- Right of hot pursuit
- Flag enquiry
- Italian law 100/1958

2) HARBOUR ORGANIZATION AND REGULATION OF MAIN PORT SERVICES
- Harbour master's duties
- Harbour master normative power
- Port fire plan
- Orders to move out of shooting-range

3) CO-ORDINATION OF SEARCH AND RESCUE OPERATIONS

Back to contents

- General notions
- Italian SAR plan

4) ASSISTANCE AND SALVAGE
- General notions
- Difference between assistance and salvage

5) COMMAND OF PATROL BOAT
- Ship's documents
- Functions and responsibility

6) THE SHIP
- Major ship, small craft, pleasure yacht and fishing boat

SUBJECT 5 OF 6

COMMUNICATION – Hours 22

1) INTERNATIONAL SIGNAL CODE
- Code description
- Content and use of appendix
- How to make affirmative, negative and interrogative signals; parts in clear
- Code enclosed - MERSAR: content, definitions, communications during SAR operations
- Coding and decoding signals exercises
- Communication by use of flags; meanings of different flags

2) RADIO WAVES PROPAGATION
- General information about electromagnetic wave propagation (VHF), aerials
- VHF/FM apparatus (fixed and portable)

3) GENERAL RADIOTELEPHONE PROCEDURES
- Frequencies /call channel/ rescue channel and work channel in the maritime mobile service. Priority order in the communication. Silence periods/listening in function of the used frequency
- Call signs, identification calling (purpose, composition and assignment)- SMM2 and U.I.T publications in relating call signs/identification calling used internationally (Name of the radio stations)
- RTF procedures provided from ISC: basic message scheme; start connection, call and answer, corrections, repetitions

4) GENERAL RESCUE PROCEDURES
- International organization for the safe of human life at sea. - GMDSS. International radiophone rescue communication (distress signal, call, rescue message, receipt, etc)
- Urgency procedure
- Security procedure: different kinds of notice of mariners (Navarea - Navtex - Avurnav), procedures adopted in Mediterranean States
- General information about INMARSAT, SART, COSPAS-SARSAT systems and Vessel Traffic Services

SUBJECT 6 OF 6

SEAFARING TRAINING – Hours 55

1) ROPES
- General information about different types of ropes, their classification and maintenance

2) KNOTS

Back to contents

- Carrying out and practical use of the main knots
- Splices

3) ANCHORS, CHAINS, BUOYS

- Descriptions and practical use of main types of anchors, chains, buoys and their maintenance
- Floating anchor

4) VARIOUS TRAINING

- Use of blocks and cranes (tackles); their maintenance
- Use of painter

Back to contents

Seamanship

COMMAND NAVAL OFFSHORE PATROL UNIT QUALIFICATION COURSE FOR OTHER POLICE/ ARMED FORCES

Reference No
1.5

Duration
22 weeks

Frequency
One course per year

Course min/max number
Minimum 8

Accomodations
Board at school in barracks

Aim of course

To assume the command of offshore patrol units

Outline syllabus

Subjects

- Ship handling
- Navigation and Meteorology
- Maritime laws
- Naval construction
- Communication (Radio Apparatus)
- Engines
- Naval Construction and Board Systems

Entry Standards

Capable to swim

Examination

Practical and/or written final exam on the subjects indicated above.

Remarks

At the end of the course, participants will get a Certificate of Attendance.

Back to contents

1.5

COMMAND NAVAL OFFSHORE PATROL UNITS QUALIFICATION COURSE FOR OTHER POLICE/ARMED FORCES - SYLLABUS

SUBJECT 1 OF 7

SHIP HANDLING -Hours 247

1) DETAILED KNOWLEDGE OF UNIT

2) UNIT TRIM
- Effects on the trim, stability and seaworthy loading, discharging and shifting of weight on board

3) MANOEUVRE
- Practical knowledge and remote control use
- Alongside and astern mooring and leaving
- Buoy mooring
- Mooring beside another vessel
- Man overboard (Williams and Boutackoff manoeuvres)
- Towing

4) SEARCH AND RESCUE (SIMULATION OF SEARCH AND RESCUE)
- Practical application of the Navigation, Meteo and Communication theory
- Use of ship's instruments

5) NAVIGATION WITH UNFAVOURABLE WEATHER CONDITIONS
- Theory and behaviour at sea

SUBJECT 2 OF 7

NAVIGATION AND METEOROLOGY - Hours 133

NAVIGATION

1) PRELIMINARY ELEMENTS
- Earth: Shape and dimensions, rotation axis, poles, main movements of the earth
- Circles: Great circles, minor circles, meridians, parallels, equator
- Latitude, Co-latitude, Longitude, difference of latitude, difference of longitude
- Mile; Conversion formulas from miles to kilometres and vice versa
- Knot; Conversion formulas from meters per second to knots and vice versa
- Using the nautical tables nr. 30 and 31
- Time zone
- Times of sunrise and sunset
- Using the nautical table nr. 32
- Using the Nautical Almanac

2) SENSE OF DIRECTION
- Horizontal local coordinates
- Vertical, rational horizon, vertical surfaces, cardinal points
- Azimuth; azimuth measure (circular and quadrant systems)
- Compass card, main winds
- Course , Route, considerations about course and route
- Great circle navigation, rhumb line navigation, choice of the track
- True bearing, polar bearing

3) GEOGRAPHICAL REPRESENTATION

Back to contents

- Inaccuracies due to the misrepresentation presented when using a superficial spherical map of the earth (a flat map); properties of the charts that eliminate distortions (Isogonic property, isometric property, equivalence)
- Construction systems of the charts, reduction scale, chart subdivision on the basis of the reduction scale
- Mercator's projection chart
- Gnomonic projection
- Nautical plan
- Information on the charts
- General information of electronic cartography

4) DEAD RECKONING NAVIGATION
- Dead reckoning navigation problem
- Graphic solution of basic problems
- Instruments used to measure course and speed
- Using the nautical table nr. 1
- Magnetic field of the earth
- Magnetic variation and deviation
- Formulas to convert true course in compass course and vice versa
- Exercises to convert compass course in true course and vice versa
- Compensation and deviation tables
- Effect of the stream, wind and sea (Drift and leeway)
- Graphic solution of drift problems
- Graphic solution of leeway problems
- Errors of the estimated navigation

5) PILOTAGE
- General information
- Place of position equal azimuth
- Systems for bearing measurement
- Formulas to convert true bearing into compass bearing and vice versa with practical exercises
- Formulas to convert a relative bearing into true bearing
- Instruments used for determining a position line of equal azimuth
- Place of position of equal difference azimuth and particular case of alignment
- Construction of an able circle
- Instruments used for determining the position line of equal difference of azimuth
- Position line of equal distance, instrument used for measuring it (radar)
- Position line of equal depht, instrument used for measuring it (echo sounder)
- Isolated position line (safety and driving)
- Fix with two or three position lines
- Shifting position lines
- Fix obtained shifting the first bearing at the time of the second bearing
- Fix obtained using two bearings of the same object took in two different times
- Errors of the position lines
- Use of Pilots in pilotage

6) INFORMATION ON ASTRONOMY
- Recognition of the Polar
- Signs about measuring of the celestial bodies and the angles using the marine sextant and Nautical Almanac (Latitude from altitude of pole star)

7) RADIO AIDS TO NAVIGATION
- Description of Radar and GPS
- Using of Radar
- Using of GPS

8) KINEMATICS
- Movement (absolute and relative)
- Bearings and plotting
- Relative movement between two units (plotting exercises)

Back to contents

- CPA (Closest Point of Approach)

9) GRAPHIC SOLUTION OF KINEMATICS PROBLEMS
- Risk of collision
- Calculate the true route and speed of a target
- Calculate the route of the nearest approaching ship to another ship travelling faster
- Calculate the route to pass another vessel at a fixed minimum distance

10) SEA MARKS
- Classification of maritime signals
- Characteristics and sectors of lighted signals
- Sound and radioelectric signals
- Description and using of List of lights and radio services for navigation
- Nominal, luminous and geographic range of the lighted signals and exercises with use of nautical tables n. 6 and 7
- Maritime signal system AISM/IALA;
- Symbols represented on signal system map (AISM/IALA)

11) UPDATING OF THE NAUTICAL DOCUMENTS
- Periodical and occasional updates to nautical documents; notice of mariners

12) RADIODIFFUSION OF THE NOTICE OF MARINERS
- Description of the system W.W.N.W.S. and NAVAREA notices

13) PLOTTING PRACTICE
- Plotting rules
- Plotting exercises

METEOROLOGY

1) PRELIMINARY INFORMATION
- Purpose of the Meteorology
- Atmosphere: its composition, nomenclature and characteristics of the stratus

2) TEMPERATURE
- Introduction, propagation and absorption of the radiation
- Vertical trend of temperature
- Isotherm
- Temperature range
- Temperature measurement. Thermometric scale, air temperature measurement
- Using the nautical tables nr. 27, 28 and 29
- Instruments used for measuring the temperature

3) ATMOSPHERIC PRESSURE
- Measuring the atmospheric pressure; unit of measurement
- Instruments used for measuring the pressure
- Corrections to mercury barometer measurement
- Using the nautical tables nr. 13a, nr. 13b and nr. 13c
- Isobars and isobaric patterns
- Pressure variation
- Barometric trend
- Topography of an isobar surface

4) ATMOSPHERIC HUMIDITY
- Steam in the atmosphere
- Absolute, specification and relative humidity
- Dewpoint
- Using the nautical table nr. 14
- Instruments used for measuring humidity

Back to contents

5) WINDS

- Introduction: forces that generate the winds
- Wind classification
- Tropical cyclones
- Atmospheric disturbance not associated to isobaric patterns
- Stau and Fohen
- Instruments used for measuring the wind
- Using the nautical tables nr. 15 and nr. 16
- Method for calculating real wind

6) STATE OF THE SEA AND WAVE MOTION

- Waves and state of the sea
- State of sea scale

7) CONDENSATION AND PRECIPITATION

- Introduction: Cloud classification
- Cloudiness
- Fog formation and classification (fog, mist and over cast meteo)
- Phenomenons caused by condensation
- Theory on precipitation

8) PRINCIPLES FOR WEATHER FORECASTING

- General: isobaric patterns and weather conditions

9) THE AIR MASSES

- Air masses
- Fronts and their development
- Warm front
- Cold front
- Occluded front

10) METEO SERVICE

- World Meteorological Organization
- Italian Meteorological Service

11) ORIGIN OF METEOROLOGIC INFORMATION – WEATHER FORECAST AND GRAFIC REPRESENTATIONS INTERPRETATION

- Sources of meteorological information
- Meteo information in clear
- Meteo information in numerical code or mixed
- Facsimile's graphic representation
- Interpretations of weather bulletins and the most common graphic representations (METEOMAR, FLEET FORECAST, SYNOP, ground analyses and schedules, Air analyses and schedules, significant weather maps etc)
- Gale warning advise

SUBJECT 3 OF 7

NAVAL CONSTRUCTION - Hours 81

1) WORK INVOLVING NAVAL RIGGINGS

- Different types of knots, splices and various jobs of the boatswain's locker

2) ROPE SYSTEMS

- General, balancing tackle
- Derrick's readiness, construction and manoeuvring

Back to contents

3) ANCHORS AND CHAINS

- Types of anchors
- Materials used for building the anchors and training tests
- Chain construction and quality/performance tests
- Using various kinds of anchors
- Jammed and hunged anchor
- Setting, preparing and manoeuvring the anchor
- Rounding of the cable chains

4) MOORING AND ANCHORING

- Using the main lines
- Manoeuvring and mooring ropes
- Mooring and unmooring from pier (alongside)
- Manoeuvre to take and to leave a buoy
- Enter and exit from a dock
- Theory to moor with a single anchor
- Ship at anchor in bed weather
- Check the position with ship at the anchor

5) NAVIGATION WITH BAD WEATHER

- Very rough sea- Driving in head, beam and following seas
- Using the floating anchor; changing engine revolutions to ensure slow speed ahead in very rough sea

6) ASSISTANCE AND RESCUE

- Assistance to a ship on fire
- Assistance to a ship in danger due very rough seas or break down
- London Convention
- Obligation of a ship to assist in rescue in case of request
- Co-ordination of the search operations
- Schemes for a methodical search
- Operation map for land/sea rescue
- MERSAR

7) MARITIME DAMAGES

- Intervention and measures to use in case of fire, collision, grounding, leak and abandoning of the ship

8) RULES OF THE ROAD AT SEA

- Steering and sailing rules
- Conduct of vessels in sight of one another
- Conduct of vessels in restricted visibility
- Lights and shapes
- Sound and lights signal
- Positioning and technical details of lights and shapes
- Additional signals for fishing vessels
- Distress signals
- Signals used by the units of the Italian Navy

SUBJECT 4 OF 7

COMMUNICATION (RADIO APPARATUS) - Hours 30

1) INTERNATIONAL CODE OF SIGNALS

- Code description
- Content and using of the appendix
- How to make affirmative, negative and interrogative a signal; parts in clear
- ICS enclosed - MERSAR: content, definitions, communications during SAR operations
- Coding and decoding signals exercises

Back to contents

- Communication with use of flags; meaning of different flags

2) PROPAGATION OF THE RADIO WAVES
- General information about electromagnetic wave propagation (VHF), aerials
- VHF/FM apparatus (fixed and portable)

3) GENERAL RADIOTELEPHONE PROCEDURES
- Frequencies /call channel/ rescue channel and work channel in the maritime mobile service. Priority order in the communication. Silence periods/listening in function of the used frequency
- Call signs, identification calling (purpose, composition and assignment)- SMM2 and U.I.T publications in relating call signs (call sign/identification calling) internationally used (name of the radio stations)
- RTF procedures provided from SIC: basic message scheme; start connection, call and answer, corrections, repetitions
- Practical exercise of transmission with radio apparatus
- Radio aids for navigation (part I and II)

4) GENERAL RESCUE PROCEDURES
- International organization for the safe of life at sea. -GMDSS. International radiophone rescue communication (distress signal, call, rescue message, receipt, etc)
- Urgency procedure
- Security procedure: different kinds of notice of mariners (Navarea - Navtex - Avurnav), procedures adopted in Mediterranean states
- General information about INMARSAT, SART, COSPAS-SARSAT systems and Vessel traffic services

SUBJECT 5 OF 7

ENGINES - Hours 70

1) CLASSIFICATION OF THE ENGINES
- General information about two and four-stroke Diesel engine
- General information about endothermic engines
- General information about working cycles
- Structural and moving parts

2) DIESEL ENGINES
- Principle of operation
- General information about main parts of diesel engine
- Injection systems and their components

3) INTERNAL COMBUSTION ENGINE
- Principle of operation
- General information about main parts
- General information about carburetor
- General information about ignition system

4) LUBRICATION
- Importance of the lubrication
- Lubricated engine components
- Lubrication oil characteristics
- General information about oil tests
- Filtering system and oil depurator
- Oil pollutions and its effects
- Engine lubrication system – identification and operation of each components
- Reducer oil circuit – reverse unit

5) COOLING
- Necessity and purposes of the cooling
- Engine cooling circuit – Identification and working of each components

Back to contents

- Oil cooling circuit - – Identification and working of each components
- Discussion about the main causes of failure

6) INJECTION
- Description of injectors and spray nozzle
- Description of reciprocating injector pumps and multiple injector pumps
- Description of fuel oil circuit

7) OVERCHARGING
- Description of a overcharging device

8) STARTING AND CONDUCT OF ENGINE
- Basic about starting
- Starting and stopping procedures
- Checking in navigation

9) DIAGNOSIS OF THE MAIN FAILURES OF THE ENGINE

10) MAINTENANCE ENGINE RULES
- Rules for the preservation of engines that remain stopped for more time
- Periodical maintenance for working engine
- General information about oil-fuel controls
- General information about fresh water controls
- General information concerning distribution of electric energy on board

SUBJECT 6 OF 7

NAVAL CONSTRUCTION AND BOARD SYSTEMS – Hours 27

1) SHIP'S INFORMATION
- Nomenclature and definitions, main dimensions
- Weight and volume measurement (displacement, deadweight and tonnage), load line

2) STATIC OF THE SHIP
- Archimedes' principle – Centre of buoyancy, metacentre and centre of gravity
- General condition of balance (stable, unstable, neutral)
- Stability of the balance – couple of stability transverse

3) RUDDER AND PROPELLER
- Steering qualities of the ship. Description of different rudders
- Principle and secondary effects of the rudder.
- Rudder effects with engine ahead and astern
- Propeller and hydrojet. Theory of running and lateral effects of the propeller
- Manoeuvre on single and double-screw ships

4) BEHAVIOUR OF THE SHIP IN PARTICULAR CONDITIONS
- Elements that cause stability variation and their effects: loading, movement of the weights, swinging weights and fluids, leak and grounding, altering the course at high speed, wind and sea action abeam

SUBJECT 7 OF 7

MARITIME LAW - Hours 96

1) LEGAL STATUS OF THE SEA -TERRITORIAL AND INTERNATIONAL WATERS
- Information concerning international conferences

Back to contents

- Internal sea water: legal position, coastal State powers
- The base line
- Territorial sea: legal position, right of innocent passage
- High sea: legal position, flag enquiry, right of visit and hot pursuit

2) ITALIAN COAST GUARD ORGANIZATION
- Central commands and maritime administration

3) JURISTIC POWER OF THE DISTRICT
- Orders and rules

4) THE SHIP
- Definition of a ship or floating craft
- Elements that identify a ship (Port of registry and individuation numbers)
- Ship's registry
- Ship's papers and books

5) SAFETY OF NAVIGATION
- Information on international conventions and rules of navigation and of human life at sea (SOLAS)
- Safety documents

6) MARINE POLLUTION
- General information on MARPOL, Montego Bay 1982 and Italian law 979/82 Sea Defence)

7) ORGANIZATION OF THE ITALIAN MARITIME S.A.R.
- Purpose and structure of the maritime S.A.R. plan
- Obligation concerning rescue
- SAR Italian Organization
- Units employed for SAR operation (specialized and combined)
- On scene commander (O.S.C.) and coordinator of superficial research (C.S.S.) and their tasks
- Assistance from other police/Armed forces in SAR operations
- Principle information required in case of rescue (with a craft, or person to be rescued)

8) MARITIME FISHING
- General information concerning the most important Italian professional and sporting fishing laws and principle violations and sanctions set by law

9) PLEASURE NAVIGATION
- General information concerning Italian law, classification of pleasure yachts, board documents, principle violations and sanctions, necessary qualification, insurance, certification of motor, board equipments etc.

Back to contents

Seamanship

COMMAND NAVAL OFFSHORE PATROL UNIT QUALIFICATION COURSE FOR PETTY OFFICERS, WITH COASTAL QUALIFICATION, OF OTHER POLICE/ ARMED FORCES

Reference No
1.6

Duration
10 weeks

Frequency
One course per year

Course min/max number
Minimum 8

Accomodations
Board at school in barracks

Aim of course

To assume the command of offshore patrol units

Outline syllabus

Subjects

- Ship handling
- Navigation and Meteorology
- Maritime laws
- Naval construction
- Communication (Radio Apparatus)

Entry Standards

Must have Certificate of Abilitation to command a coastal naval unit in navigation within 20 miles radius of the coast and at least two years of command.

Examination

Practical and/or written final exam on the subjects indicated above.

Remarks

At the end of the course, participants will get a Certificate of Attendance.

Back to contents

1.6

COMMAND NAVAL OFFSHORE PATROL UNITS QUALIFICATION COURSE FOR PETTY OFFICERS, WITH COASTAL QUALIFICATION, OF OTHER POLICE/ARMED FORCES - SYLLABUS

SUBJECT 1 OF 5

SHIP HANDLING – Hours 126

1) DETAILED KNOWLEDGE OF UNIT

2) TRIM
- Effects on the trim, on stability and on behaviour at sea at loading, discharging and shifting of weight on board

3) RECALLING ABOUT MANOEUVRING
- Practical knowledge and remote control use
- Alongside and astern mooring and leaving
- Buoy mooring
- Mooring beside another vessel
- Man overboard (Williams and Boutackoff manoeuvres)
- Towing

4) SEARCH AND RESCUE (SIMULATION OF SEARCH AND RESCUE)
- Use of the board fittings

5) NAVIGATION WITH UNFAVOURABLE WEATHER CONDITIONS
- Theory and conduct at sea

6) PRACTICAL APPLICATION OF NAVAL CONSTRUCTION, NAUTICAL AND METEO SUBJECTS

7) PRACTICAL USE OF NAVIGATIONAL AUXILIARY AIDS

SUBJECT 2 OF 5

NAVIGATION AND METEOROLOGY – Hours 54

1) RECALL DEAD RECKONING AND PILOTAGE

2) GENERAL INFORMATION OF GYRO COMPASS, COMPASS TURNING AND COMPENSATION OF COMPASS; RESIDUAL DEVIATIONS AND DEVIATION TABLES

3) TIME MEASURE
- Time zone
- Times of sunrise, sunset, moonrise and moonset

4) RADIOELECTRIC SYSTEMS OF NAVIGATION ASSISTANCE
- Radar and GPS description
- Using the Radar
- Using the GPS

5) PLANNING OF PRACTICAL EXERCISES OF OFFSHORE NAVIGATION TRAINING

6) ATMOSPHERE
- Its composition, nomenclature and extension

Back to contents

- Meteorological elements

7) TEMPERATURE
- Introduction, propagation and absorption of the radiation
- Vertical trend of the temperature
- Temperature range
- Thermometric scale

8) ATMOSPHERIC PRESSURE
- Measuring the atmospheric pressure; unit of measurement
- Instruments used for measuring the pressure
- Isobaric patterns

9) ATMOSPHERIC HUMIDITY
- Steam in the atmosphere
- Absolute, specification and relative humidity
- Dewpoint
- Using of the nautical table nr. 14
- Instruments used for measuring humidity

10) WINDS
- Introduction: forces that generate the winds
- Wind classification
- Tropical cyclones
- Atmospheric disturbance not associated to isobaric patterns
- Stau and Fohen
- Instruments used for measuring the wind
- Using the nautical tables nr. 15 and 16
- Method for calculating real wind

11) STATE OF THE SEA AND WAVE MOTION
- Waves and state of the sea
- State of sea scale

12) FOGS AND CLOUD CLASSIFICATIONS
- Fog and clouds

13) PRINCIPLES FOR WEATHER FORECASTING
- Fundamental: isobaric patterns and weather condition

14) WEATHER FORECAST AND GRAFIC REPRESENTATIONS INTERPRETATION
- Sources of meteorological information
- Meteo information in clear
- Meteo information in numerical code or mixed
- Facsimile's graphic representation
- Interpretations of weather bulletins and the most common graphic representations (METEOMAR, FLEET FORECAST, SYNOP, ground analyses and schedules, Air analyses and schedules, significant weather maps etc)
- Gale warning advise

SUBJECT 3 OF 5

NAVAL CONSTRUCTION – Hours 36

1) RECALL OF THE MAIN ITEMS STUDIED DURING THE COASTAL QUALIFICATION COURSE

2) SHIP'S STABILITY

Back to contents

- Trim, loading, discharging and shifting of weights

3) NAVIGATION WITH BAD WEATHER
- Very rough sea- Driving in head, beam and following seas
- Use of floating anchor; changing engine revolutions to ensure slow speed ahead in very rough sea

4) ASSISTANCE AND RESCUE
- Assistance to a ship on fire
- Assistance to a ship in danger due to very rough seas or break down
- London Convention
- Obligation of a ship to assist in rescue in case of request
- Co-ordination of the search operations
- Schemes for a methodical search
- Operative map of sea rescue
- MERSAR

5) MARITIME DAMAGES
- Intervention and measures to use in case of fire, collision, grounding, leak and abandoning of the ship

6) RULES OF THE ROAD AT SEA
- Steering and sailing rules
- Conduct of vessels in sight of one another
- Conduct of vessels in restricted visibility
- Lights and shapes
- Sound and lights signal
- Positioning and technical details of lights and shapes
- Additional signals for fishing vessels
- Distress signals
- Signals used by the Italian Navy Ships

SUBJECT 4 OF 5

COMMUNICATION (RADIO APPARATUS) – Hours 27

1) INTERNATIONAL SIGNAL CODE
- Description of code
- Content and use of appendix
- How to make affirmative, negative and interrogative signals; parts in clear
- ICS enclosed - MERSAR: content, definitions, communications during SAR operations
- Coding and decoding signals exercises
- Communication with use of flags; meaning of different flags

2) RADIO WAVE TRASMISSIONS
- General information about electromagnetic wave transmissions (VHF), aerials
- VHF/FM apparatus (fixed and portable)

3) GENERAL RADIOTELEPHONE PROCEDURE

4) GENERAL RESCUE PROCEDURES
- International organization for safety of human life at sea. - GMDSS. International radiophone rescue communication (distress signal, call, rescue message, receipt, etc)
- Urgency procedure
- Security procedure: different kinds of notice of mariners (Navarea - Navtex - Avurnav), procedures adopted in Mediterranean states
- General information about INMARSAT, SART, COSPAS-SARSAT systems and Vessel traffic services

Back to contents

SUBJECT 5 OF 5

MARITIME LAW – Hours 18

1) LEGAL STATUS OF THE SEA
- General information concerning main international conferences
- Internal sea water: legal position, coastal State powers
- The base line
- Territorial sea: legal position, right of innocent passage
- High sea: legal position, flag enquiry, right of visit and hot pursuit

2) ITALIAN COAST GUARD ORGANIZATION

3) SAFETY OF NAVIGATION
- General information of SOLAS Convention
- General information about safety documents

4) MARINE POLLUTION
- General information of MARPOL, Montego Bay (UNCLOS 1982), and Italian law 979/82 (sea defence)

5) MARITIME SAR ORGANIZATION

6) ASSISTANCE AND RESCUE
- General notions
- Distinction between assistance and salvage

7) LOCATING SHIPWRECKS

8) COMMAND OF NAVAL UNIT
- Ship's document;
- Commander of offshore patrol boat: functions and responsibility

Back to contents

Seamanship

ADVANCED COURSE FOR PERSONNEL EMPLOYED ON COASTAL PATROL BOATS

Reference No
1.7

Duration
9 weeks

Frequency
On request

Course min/max number
Minimum 8

Accomodations
Board at school in barracks

Aim of course

The purpose of this course is to give the students the basic knowledge, as part of general knowledge for all people that work at sea, concerning international maritime rights, environmental protection, the organizational structure of search and rescue activities at sea, knowledge of navigation and security rules, including an international historical-political picture that would help to acquire a multinational and cooperational ideas on all the activities. Such a training would especially benefit Petty Officers in the Navies, Coast Guards and Polices forces from other Countries stationed on board surveillance and coastal patrolling crafts.

Outline syllabus

SUBJECTS

Human Rights
International Maritime Rights
Search and rescue at sea
Safety and security
Maritime Pollution
Practical exercises
Conferences

Entry standards

Must have Certificate of Abilitation to command a coastal naval unit in navigation within 20 miles radius of the coast.

Remarks

At the end of the course, participants will get a Certificate of Attendance.

Back to contents

1.7 ADVANCED COURSE FOR PERSONNEL STATIONED ON COASTAL PATROL BOATS - SYLLABUS

SUBJECT 1 of 6

HUMANITARIAN AND ARMED CONFLICTS RIGHT – Hours 24

HUMANITARIAN AND ARMED CONFLICTS RIGHT

- Analysis of all general aspects
- General definition and application
- Routine procedures and codification (mention on principle International Conventions)
- Definition of legal combatant
- Difference between civilians and combatants, and between civilian materials and military targets (situations of the warranties of application to the categories listed above)
- Prisoners of war: general definition and their handling
- General definition of combatant without privileges and their handling
- Principle symbols set as warranty of protection

HUMANITARIAN RIGHT AND MARITIME WAR

- Specific aspects of maritime war
- Principle sources of maritime war right
- Legal combatant and set fighting methods
- Hostile assistance
- War time smuggling
- Naval blockade
- War zones
- Battle units
- Warranties of conduct and treatment for certain categories of persons and or property
- Defined Maritime war conflict zones

SUBJECT 2 of 6

INTERNATIONAL MARITIME LAWS – Hours 40

International maritime laws

- Historical information
- Maritime right codification:
  - AJA, 1930
  - GINEVRE, 1958
  - GINEVRE, 1960
  - MONTEGO BAY, 1982

Maritime areas and their legal aspects

- Classification and terminology of maritime areas
- Internal maritime waters
- Baseline
- Legal bays and historical bays
- The archipelagic Countries
- Territorial sea and its outer limit
- Contiguous zone and the Archaeological zone
- Exclusive economic zone and the continental shelf
- The continental shelf in the Mediterranean sea
- Delimitation of Continental shelf or exclusive economic zone between States with opposite or adjacent coasts
- Important points to set outer limits (the geography, the geology and geophormology, politics, military, biological and ecologicals and economics)
- The exclusive economic zone in the Mediterranean sea

Back to contents

- High sea
- Sea bottom international areas:
- high sea bottoms as common privilege for all mankind and problems to resolve
- Right to fish in high sea
- Marine scientific research

International navigation rules

- Navigation:
  - internal waters
  - territorial seas
  - in the straits
  - in exclusive economic zone
  - in high sea
- Nationality of ships
- Definition of warship according to international law
- Government ships working
- Legal immunity
- Legal position on foreign merchant and military ships in internal maritime waters, in the territorial sea and in high sea

Rights of the International police forces

- Right of visit:
  - piracy
  - slave trade
  - unauthorized trasmissions
  - flag enquire (right of approach)
  - protection of cable and underwater pipelines
  - terrorism at sea
  - drug dealing at sea (Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances)
  - traffic and transportation of illegal aliens at sea
  - naval blockade
  - naval embargo
- Right of hot pursuit

SUBJECT 3 of 6

MARINE POLLUTION – Hours 40

- Definition of marine pollution.

- Protection of marine environment in the international law:
  - schedule on the evolving rules and analysis of legal picture set by the International Community to protect the Mediterranean sea.

- Environmental damage
  - responsibilities relating to oil-polluting and transportation of dangerous goods
  - general overcheck of international conventions

- Environmental prevention in a sea area
  - flag state control and port state control
  - merchant ship's certificates
  - traffic control with VTS system

- Oil substances
  - types, chemicals and physical characteristics
  - Effects of an oil spill on the sea

- Antipolluting techniques

Back to contents

- confinement
- containment
- removal (analysis of different types of intervention such as mechanic cleansing, absorbing, spreading and burning
- legal aspects related to the safety in the anti pollution actions

- Cleansing on the coasts
  - intervention in case of arriving a shore of the polluting substances

- Analysis from polluting by chemical products

- Theorical simulation

- Conclusions

SUBJECT 4 of 6

SAFETY AND SECURITY - Hours 40

- The internationally evolving laws concerning security of navigation and safety of the human life at sea. Ratification by the Countries.

- Particular examination of the SOLAS concerning aspects relating to:
  - Search and rescue
  - GMDSS system with analysis of descending systems
  - VTS system (monitoring naval traffic – objective)
  - Life saving appliances on board ships
  - Types of navigation
  - Ship's certification
  - Managing emergencies on board
  - port state control (PSC) and Flag State control (FSC)

- General information concerning:
  - dangerous good sea transport(I.M.D.G. – INTERNATIONAL MARITIME DANGEROUS GOODS Code);
  - safety management on board(I.S.M. – INTERNATIONAL SAFETY MANAGEMENT Code);

- Security
  Security rules to protect merchant traffic at sea
  - IMO strategy
  - SOLAS emendations (Cap. XI-1 / XI-2)
  - Ship's certificate – Harbour – Key institutions in the Security;
  - Purpose and analysis of ISPS general aspects (INTERNATIONAL SHIP AND PORT SECURITY Code).

SUBJECT 5 of 6

SEARCH AND RESCUE - Hours 24

- The Dec 7, 1944 Chicago Convention on International Civilian Aviation –
  - ANNEX 12 "SEARCH AND RESCUE";

- International Convention of Safety of Human Life at Sea
  - (S.O.L.A.S. – London 1974): -examination of rules relating search and rescue; different types of distress signals and their use on board ships, airplanes and persons in danger.

- International Convention of Search and Rescue at Sea – Hamburg 1979
  - Studies about the convention and particularly:

Back to contents

- Chapter 2 “Organization”
- Chapter 3 “Co-operation”
- Chapter 4 “Preparatory measures”
- Chapter 5 “Operative procedures”
- Chapter 6 “Ship Reporting Systems”

- I.A.M.S.A.R. Volume 3 – International manual for air and maritime search and rescue
  - Examination of different searching schemes.
  - Italian SAR organization in the Mediterranean sea.

- Practical exercises on the nautical charts of different search schemes and drills on board coast guard patrol boats with simulation of rescue operations.

SUBJECT 6 of 6

THEMATIC CONFERENCES -Hours 24

- SAR organization in Italy and structure of the Coast Guard General Command operational center
- Security and International Ship and Port Security Code
- The Virtual Regional Maritime Traffic Center
- Maritime interdiction operations
- Techniques of maritime antipollution operation
- Vessel Traffic Center (visit at the VTS Station in La Maddalena)
- Mediterranean sea as centre of social and economical interests and valuable individual regional identity:
  Module 1 - History, ethnology, economical and political geography, general of merchant traffics;
  Module 2 - General information about Euromediterranean partnership, international co-operation between countries of the Mediterranean sea coastline.

Back to contents

2

MARINE ENGINEERING

Marine Engineering

HULL, SHIP SYSTEMS AND DIESEL MARINE - MAINTAINER BASIC COURSE (first lower level)

Reference No
2.1

Duration
16 weeks

Frequency
Two courses per year

Course min/max number
Minimum 8

Accomodations
Board at school in barracks

Aim of course

- To provide to Ratings, a comprehensive basic knowledge of the theory, operation and maintenance of the hull, auxiliary equipment and systems, main propulsion and electrical generating diesel engines.
- Carry out basic engine/equipment repairs.
- To enable the student, after a proper period on job training at sea, the management of engine up to 450 KW on board small surface unit.

Outline syllabus

- Engines:
  - Theoretical: terminology, general construction, two and four stroke cycles, fuel system, transmission, injectors, combustion, pressure charging, lubrication system, refrigeration, starting, general preventive engine maintenance;
  - Practical: preparation of starting engine, supervise the running of main propulsion, main failures.
- Hull and main auxiliary equipment and systems including air conditioning plant, refrigeration machinery, compressed air system and equipment, hydraulic machines, chilled water system.
- Electrotechnical and main electrical machines with examination of general safety rules;
- Workshop, technologies and practical use of main hand tools.

Entry standards

- Previous diesel engines and systems is not necessary.
- Intermediate school.

Examination

Written final exam

Remarks

At the end of the course, participants will get a Certificate of Attendance.

Post course recommendations

Ideally a period in a sea-going ship to consolidate the knowledge and skills obtained during the course.

Back to contents

2.1

HULL, SHIP SYSTEMS AND DIESEL MARINE – MAINTAINER BASIC COURSE (first lower level) - SYLLABUS

SUBJECT 1 of 4

ENGINES

1) ENGINES CLASSIFICATION

2) RECIPROCATING INTERNAL COMBUSTION ENGINES STRUCTURE

3) DIESEL ENGINE
- Working principles
- 4 strokes diesel engines; engine operations, ideal and actual engine cycle on P-V coordinates
- 2 strokes diesel engines; comparison between 4 strokes diesel engines and 2 strokes diesel engines

4) MAIN ENGINE PARTS
- description and identification of main engine parts
- main structural parts (crankcase, cyliders block, cyliders heads) and main moving parts (crankshaft, connecting rod, pistons , piston rings)
- operation of 4 strokes engine cycle
- thightening of cylinders' head bolts using torque wrenches

5) TIMING SYSTEM
- 2 – 4 strokes engine's time diagrams
- identification in SMS of timing system parts(camshaft, rocher arm, push rod, valves, intake manifold, exhaust manifold): reference on engine technical publications about different components' tolerance values.

6) FUEL INJECTION
- mechanical injection: direct and indirect injection
- technical description about injectors and spray nozzles
- technical description about multiple and single alternative injector pumps (Bosh type)

7) COMBUSTION
- combustion reaction, engine fuels, cetane number
- ignition delay and injection advance

8) ENGINE FUEL SYSTEM
- fuel system blocks diagrams (GMT B 230 engine type); diesel oil filters
- feed fuel pumps general information
- principle of operations of diesel oil depurator
- rules and safety precautions about fuel transfer on board of ships

9) ENGINE LUBRICATION
- general information and lubrication purpose, lubrication systems
- lubrication oil's characteristics, used oil types
- greasing and lubrication manner ; oil and grease employment
- technical description about lubrication system and its parts (general information about gear pumps, screw pumps, filter systems)
- training tests about flash point and standard measure
- technical description about oil depurator

10) ENGINE COOLING
- purpose of engine cooling
- sea water and fresh water blocks cooling diagrams
- description of main cooling system components and control parameters survey in Engine Control Room

Back to contents

11) OTTO ENGINES
- principle of operation and parts description (general information about carburetor and ignition system)
- internal combustion engines driven pumps: parts description, using manner and safety precaution

12) SUPERCHARGING
- purpose of supercharging, supercharged diesel engines; general information about supercharging systems

13) ENGINE RUN
- starting systems (manual system, electrical system, pneumatic system)
- general information about electrical starting system
- pneumatic starting system's main parts

14) AUTOMATION SYSTEMS
- general information about engine governors

15) ENGINE PRE-STARTING SET-UP
- engine pre-starting checks; pre-sailing set-up
- working parameters checks during motion, working limits; rules to follow when starting, driving and stopping engines
- engine troubleshooting

16) MAIN ENGINE MAINTENANCE SCHEDULE
- purpose, schedule maintenance cards (calendar cards), log-books general information

17) PLATFORM TEAM ORGANIZATION AND PROPULSION PLANTS CONFIGURATION
- engineering team organization on board of ITS ships
- propulsion plants configuration on board of ITS ships
- main propulsion plant blocks diagrams
- reversing gears, clutches, reduction gears, shafts, variable blades propellers

18) GRIPES, STOWAGE AND TIDY-UP
- men warnings due of bad gripes
- fire warnings due of bad tidying-up
- warnings about bad limber boards position due to servicing maintenance apparatus
- correct ways to do gripes and tidy-up

19) BRIEFING OF NAVY CULTURE
- rope's service requirements; braking strain and safe working load
- making and using knots; training to place people and cargos in a sling

SUBJECT 2 of 4

BOARD MACHINES

1) ANTIACCIDENTS AND MINOR MAINTENANCE – PASSIVE PROTECTION
- Safety rules:
  - Precaution to take for painting and removing rust
  - Work at upper parts of superstructure (masts and funnels)
  - Work with electric systems
  - Work above scaffolding
  - Loading/Discharging fuel-oil
  - Work with dangerous fluids (air-compressed, steam, etc.)
  - Manoeuvre with swinging weights - tackles
  - Ship in drydock
  - Using and preservation of compressed gas containers
  - Precautions to take for the board workrooms
  - General information of passive protection manual

Back to contents

- Elements of fire prevention and estinguisher devices:
  - H_2O, CO_2, Halon, foam, powder
  - Fixed and semi-fixed systems
  - Scheme and description of fire line

2) HYDRAULIC MACHINES (PUMPS)
- Description and scheme of the pump
- Rules of conduction:
  - Pump delivery adjustment in the different types of pumps
  - Priming, cavitation, reverse-pump
  - Description of different devices to prevent pump's leakages
- Elementary failures

3) GENERAL INFORMATION OF HYDRAULIC VALVES
- Description and use of these valves:
  - Sea valve
  - Mushroom valve and control valve
  - Semi self-closing and non-return valve
  - Pressure reducer valves
  - Valve with remote control (mechanical -electric-pneumatic)

4) AUXILIARY BOILERS FOR STEAM PRODUCTION
- Auxiliary boiler for warm water
- Components description and running
- Description of automatism and safety systems
- Main failures and actions to take
- Description of "Bono boiler"

5) OILDYNAMIC EQUIPMENTS
- Main definitions of oildynamic and elementary schemes
- Rudders
- Blocks diagram system of a idraulic steering engine system and description of each components
- General information of stabilizer system
- General information of capstans and winches

6) FRESH WATER PRODUCTION ON BOARD
- "SCAM " evaporator: general information of its working principle
- Starting practical proof and running: "Scam" evaporator, "Bono" boiler
- Distillation apparatus "Rochem": components and functioning principle
- Practical proof of working
- Maintenance of failures

7) REFRIGERATOR SYSTEM FOR COLD STORAGE
- Working principle
- Refrigerator blocks diagram system and main component's description
- Working, safety systems/automatisms and description of the auxiliary components
- Maintenence and elementary failures:
  - Fill up/empty compressor lub-oil
  - Fill up refrigerant fluid
  - High/low pression freon
  - Defrosting

8) CONDITIONING SYSTEM
- General information of compressor and fan air machines
- Compressors and fans
- Blocks diagram description of a direct and indirect expansion system with its components and running
- Running, safety systems and automatisms
- Description of the functioning of these components:
  - Alternative and centrifuge compressor
  - Air conditioners

Back to contents

9) BILGE WATER AND SLUDGE DEPURATORS

- Running principle of bilge water depurator
- Description running and safety devices of the FRAM OP 10
- Running principle sludge treatment device
- Description of following systems:
  - ATLAS
  - HAMANN
  - P.C.E. BIODISK FVN

SUBJECT 3 of 4

ELECTROTECHNOLOGY AND COMPUTER BASIC KNOWLEDGE

1) RECALLING OF PHYSICS OF THE MATERIAL

- Atomic configuration of the material
- Electricity characteristics
- Conductors and insulators

2) MAIN ELECTRICAL VALUES

- Difference of force, electric current and electric resistance
- Workroom: measurement tests of the main electrical values (use of voltmeter, amperometer and insulation meter)

3) ELECTRIC CIRCUITS IN DIRECT CURRENT

- Parts of electric circuit in direct current
- Law of Ohm
- Voltage drop
- Series and parallel resistances electric
- General information about resolution of the electric nets and Kirchhoff"s principles
- Electric power, Joule effect and electric force
- Workroom: elementary electric circuit in direct current; measures and practical checking

4) ELECTROSTATICS

- Electric field
- General information of law of Coulomb
- Condenser – collegamento in serie e parallelo, tempo di carica e scarica

5) MAGNETISM AND ELECTROMAGNETISM

- General information about magnetism and electromagnetic fields
- Intensity of the magnetic field
- Electromagnetic induction
- Lenz' law

6) ALTERNATING CURRENT

- General information about variable values and graphic representation of alternating current
- General information about elementary circuits in alternating current
- Electric power in alternating current – General information of single-fase and three-fase circuits
- Workroom: Experiences about electric measurement on alternating current circuits

7) GENERAL INFORMATION ABOUT ELECTRIC MACHINES

- Transformers
- Alternators and engines in alternating current.
- Dynamos and engines in alternating current
- Workroom – Practice working on the main electric machines

8) ELECTRIC BOARD SYSTEMS

Back to contents

- General information about electrical board systems and electrical net characteristics in use on board of ships
- Batteries
- Electrical board panels and system's protection

9) RULES OF SAFETY
- Main dangers of the electric current
- Electrical protection systems and safety rules

10) BASES OF ELECTRONIC
- General information about semiconductors
- General information about base circuits
- Examples of electronic application (general information about automatic adjustment)

11) BASES OF COMPUTER SCIENCE
- Hardware (components of a PC and peripherals)
- Software, main operative and applying systems

SUBJECT 4 of 4

TECHNOLOGY AND WORKROOM

1) TECHNOLOGY
- General information of alloys and termic treatings
- Measure instruments: micrometer and callipers
- Bolts' classification
- Gaskets – Types and uses
- General description of machines tool:
  - Lathe
  - Drill
  - Milling cutter
  - Slotting machine/Saw

2) WELDING
- Electric welding: Kinds of welding and uses; types of electrods and their choice
- Technical welding and cutting with oxiacetylene flame
- Practical proof

3) CONTRIVER
- To carry out a plan

Back to contents

Marine Engineering

HULL, SHIP SYSTEMS AND DIESEL MARINE - MAINTAINER BASIC COURSE (first upper level)

Reference No
2.2

Duration
11 weeks

Frequency
One course each year

Course min/max number
Minimum 8

Accomodations
Board at school in barracks

Aim of course

To provide to Ratings, a upper level basic knowledge of the theory, operation and maintenance of the hull, auxiliary equipment and systems, main propulsion and electrical generating diesel engines to enable the management of engines up to 800 KW per shaft.

At the end of course the student must be able to:

- carry out watch keeping duties on main propulsion and electrical generating diesel engines and be aware of faults and their dangers
- diagnose main faults that require the passage to a degraded operational mode;
- operate specific equipments in the degraded operational mode, under control of a supervisor.
- carry out support collateral activities;
- carry out minor repairs and carry out planned maintenance task under supervisor control;

Outline syllabus

- Engines:
- Hull and main auxiliary equipment and systems
- Electrotechnical and main electrical machines with examination of general safety rules;
- Workshop, technologies and practical use of main hand tools.

Entry standards

Attended previous course about hull, ship systems and diesel marine maintainer basic (lower level) and an appropriate period of practical experience through on the job training at sea (minimum 18 months)

Examination

Written final exam

Remarks

At the end of the course, participants will get Certificate of Attendance.

Course content is similar in many respects to **HULL, SHIP SYSTEMS AND DIESEL MARINE - MAINTAINER BASIC (first lower level) COURSE** but instruction is to greater depth aimed at producing a upper level operator and carry out planned maintenance.

Post course recommendations

To gain practical experience through on the job training at sea on board vessel with engine at least or above 450 KW to consolidate the knowledge and skills obtained during the course.

Back to contents

2.2

HULL, SHIP SYSTEMS AND DIESEL MARINE – MAINTAINER BASIC COURSE (first upper level) - SYLLABUS

SUBJECT 1 of 4

BOARD MACHINES

1) ANTIACCIDENTS AND MINOR MAINTENANCE

- General precaution:
  - no smoking, no stop, no entry, no going around
  - safety working guide
  - movement of the person/crew in the port and during navigation
- Rounds in less frequented rooms
- Entrance /work in rooms normally closed
- Precautions while for painting and removing rust
- Outboard work
- Work at upper parts of superstructure (masts and funnels)
- Work above scaffolding
- Loading/Discharging fuel-oil
- Fuel management on board of ships
- Using and preservation of compressed gas containers
- Air-compressed work or high pressure system work
- Manoeuvre of tackle. General safety rules about machineries, equipment, electric and electronic circuits

2) BILGE WATER AND SLUDGE DEPURATORS

- Principle of running of bilge water depurator and component's description
- Rules of bilge water depurator conducting
- Principle of running sludge treatment device and component's description
- Rules of system's conducting

3) HYDRAULIC MACHINES (PUMPS)

- General information about principle of working of centrifuge and volumetric pumps
- Head
- Rules of conduction pumps :
  - priming
  - cavitation
  - maximum height of suction

4) OILDYNAMIC EQUIPMENTS

- Running principle and component's description:
  - hydraulic steering engine system
  - capstans and winches

5) AUXILIARY BOILERS FOR STEAM PRODUCTION

- "Bono" boiler: circuits and components
- "Bono" boiler: running
- "Bono" boiler: rule of conduct, Main failures and actions to take

6) FRESH WATER PRODUCTION ON BOARD

- "SCAM " evaporator: working principle, circuit and components
- Starting practical proof and running: "Scam + Bono"
- Distillation apparatus "Rochem": components and working principle
- Practical proof of working
- Maintenance of failures

Back to contents

7) REFRIGERATOR SYSTEM FOR COLD STORAGE

- Call back about running, circuit description, components and their function
- Rules of conduct and adjustement
- System's maintenance and action to take in case of main failures:

8) AIR CONDITIONING SYSTEMS

- Circuit description and components
- Adjustment and main maintenance

SUBJECT 2 of 4

ELECTROTECHNOLOGY

1) ELECTRONIC CONFIGURATION OF THE MATERIAL

- Conductors, insulators and semiconductors
- Behaviour of the electrons in the metals

2) DIRECT CURRENT

- Study of voltage, current intensity and electric resistance
- Law of Ohm
- Series and parallel resistances electric connection
- Electric power in direct current – Law of Joule
- Real and ideal generators, series and parallel connection
- Workroom: electrical insulating measurement
- Workroom: using of universal analyzer toolkit

3) ELECTROSTATICS

- General information of condensers, condensers connection, charge and discharge

4) ELECTROMAGNETISM

- General information about magnetism and electromagnetic fields
- Magnetic field in the materials
- Electromagnetic induction
- General information about main electrical machines operation (generator, engine, transformer)

5) ALTERNATING CURRENT

- General information of alternating values:
  - uniform and variable value
  - periodical value
  - alternating and sinusoidal alternating value

6) GENERAL INFORMATION OF BOARD ELECTRIC SYSTEMS

- General information about electrical board systems and electrical net characteristics in use on board of ships
- Electric power distribution on board
- Main antiaccident rules

SUBJECT 3 of 4

ENGINES

1) PHYSICS CALLS BACK

- meaning of force, work, power, pressure, and other physical quantities, their unit of measure using S.I. e S.T units.
- meaning of heat and temperature; specific heats; their unit of measure using S.I. e S.T. units; thermometric scales

2) RECIPROCATING INTERNAL COMBUSTION ENGINES

Back to contents

- heat fluid engines classification; reciprocating internal combustion engines' structure call back
- 4 strokes diesel engines; engine operations, ideal and actual engine cycle on P-V coordinates

3) ENGINE GEOMETRIC ELEMENTS
- top dead centre; bottom dead center; stroke; bore; displacement (vcg); combustion chamber volume (vcc); cylinder total volume(vt); engine displacement (vcgt); compression ratio

4) TIMING SYSTEM
- 2 – 4 strokes engine's time diagrams
- timing system parts (camshaft, rocher arm, push rod, valves, intake manifold, exhaust manifold): components practical identification with reference on engine technical publications.
- top dead centre searching; rotation line searching; general information about timing system timing
- engine valve tappets set-up

5) COMBUSTION
- combustion reaction, exhaust gas; fuel atomization
- fuel characteristics; general information about fuel management safety precaution/antipollution

6) FUEL FEED AND FUEL INJECTION
- fuel system (fuel tanks, fuel feed tanks, fuel depurator, fuel feed pump, filters, injection pump, injectors)
- bosh type injector pump (description, operation, disassembly, assemble, pump timing on itself and pump timing on engine
- fuel injectors and fuel spray nozzles (description, operation, disassembly, assemble, tests)

7) ENGINE LUBRICATION
- lubrication purpose and theory, lubrication systems
- types of lubrication oil and their characteristics
- greasing and lubrication manner ; oil and grease employment
- lubrication system's components (with prelubrication system and oil depurator)
- pumps, filters, (filter's cartrige, self cleaning filters, centrifugal filters, magnetical filters, duplex filters type)
- oil tests (flash-point, viscosity) and types of lubrication oil pollution

8) RUN ENGINE
- manual starting systems and electrical starting systems
- pneumatic starting system; number of cylinders needed to accomplish running of an engine
- pneumatic starting system components, causing failure to run an engine.

9) ENGINE COOLING
- open system and close system; general information and working values
- circuits main parts (pumps, compensation tank, coolers, thermostatic valve)
- pre-heating circuit
- procedures for the internal cleaning of exchange device

10) SCAVENGING - SUPERCHARGING (GENERAL INFORMATION)
- methods of scavenging and scavenging blower; principle of operation of turbosupercharger

11) ENGINE CONTROL IN ENGINE ROOM
- description of GMT 230.6 engine; circuit maps; engine pre-starting checks, engine control, engine turn-off; working parameters checks during motion

12) ENGINE GOVERNOR (GENERAL INFORMATION)
- principle of operation; description of UG8 and UG40 engine governor

13) REVERSING RUN- CLUTCHES-REDUCTION GEARS-PROPELLERS
- clutches and couplings on board
- direct and inverse reversing run
- reduction gears
- fix and variable blades propellers

Back to contents

14) TRAINING ON ASSEMBLY AND DISASSEMBLY of engine parts in assembly-disassembly room

- general information about main maintenances on diesel engines
- injection pump assembly-disassembly
- timing system timing
- injection pump timing
- change of cylinder head

SUBJECT 4 of 4

WORKROOM

1) TECHNOLOGY

- Measure instruments
- Description and employ:
  * callipers
  * micrometer
  * dial test indicator
  * iron surface plate
- Thermic treatments
- Alloyes

2) ELECTRICAL WELDINGS

- Types of welding and their use
- Type of electrods and their choice
- Practical proof

3) WELDING AND CUTTING WITH OXIACETYLENE FLAME

- Safety rules
- Knowing different kinds of welding torch and reductor valves
- Deposit, weldings, cuts

4) TURNING

- Illustration of machines characteristics
- Practical proof

Back to contents

Marine Engineering

HULL, SHIP SYSTEMS AND DIESEL MARINE - MAINTAINER ADVANCED COURSE (RATINGS)

Reference No
2.3

Duration
11 weeks

Frequency
One course each year

Course min/max number
Minimum 8

Accomodations
Board at school in barracks

Aim of course

To enable Ratings up to petty officers, to:

- operate, after an appropriate period on the job training on board surface units with engines above 800 KW per shaft, on engines up to 2400 KW per shaft;
- supervise the running of main propulsion and electrical generating diesel engines;
- carry out general engine maintenance;
- diagnose faults and supervise or carry out the appropriate rectification

Outline syllabus

- Engines;
- Hull and main auxiliary equipment and systems;
- Electrotechnical and main electrical machines with examination of general safety rules;
- Workshop, technologies and practical use of main hand tools.

Entry standards

- Frequency of previous basic diesel course;
- To have certificate to operate engine up to 800 KW per shaft;
- Appropriate experience on the job training on sea-going ships.

Examination

Written final exam

Remarks

At the end of the course, participants will get a Certificate of Attendance.

Back to contents

2.3

HULL, SHIP SYSTEMS AND DIESEL MARINE – MAINTAINER ADVANCED COURSE (RATING) - SYLLABUS

SUBJECT 1 of 4

ENGINES

1) PHYSICS AND THERMODYNAMICS CALL BACK

- Systems of unit measurement, physics quantities
- Heat and temperature, specific volume, absolute and relative pressure, heat transmission.
- First and second thermodynamics laws
- Ideal gases transformation
- Thermodynamics cycles and cycles' efficiency
- Graphic work performance on PV axis

2) DIESEL ENGINE

Engines classification and reciprocating internal combustion engines structure's call back

- Principle operation of 4 strokes and 2 strokes diesel engines
- diesel engines ideal cycle and its efficiency
- Sabathè ideal cycle and its efficiency
- 4 strokes and 2 strokes engines actual cycle

3) DIESEL ENGINES' COMBUSTION

- Combustion reaction and combustion developing in diesel engines
- Stoichiometric ratio, combustion reaction's air necessary, injection delay, injection advance and its calculation
- Exhaust gases temperatures, diesel engine combustion defects, liquids fuels and their characteristics
- Fuel system and its parts, fuel management on board of ships

4) TIMING SYSTEM

- Timing system components
- 4 strokes diesel engine's time diagram

5) FUEL INJECTION

- Bosch type injector pump
- Fuel injectors and fuel spray nozzles, fast diesel engines' problems
- Auxiliary combustion chambers and their working
- Glow plugs, new injection systems (common rail system)

6) OTTO ENGINE

- Principle of operation of 4 strokes and 2 strokes otto engines
- Ideal otto cycle and its efficiency
- 4 strokes and 2 strokes engines' actual otto cycle
- otto engine's combustion reaction , gasolines and its characteristics
- combustions' defects (preinjection, self-injection, detonation)
- 4 strokes and 2 strokes otto engines' time diagram

7) OTTO ENGINE INITION SYSTEM

- distributor injection system, general information about electronic injection, spark plugs.

8) ENGINE LUBRICATION

- Lubrication purpose, operation of load bearings and thrust bearings
- lubrication oils' characteristcs
- SAE classification and lubrication systems
- lubrication circuit's main components (oil pump, filters, thermostatic valve, cooler, centrifugal filter)

Back to contents

9) ENGINE COOLING

- purpose of engine cooling, coolants, cooling systems (open system and close system)
- cooling system's main components (pump, thermostatic valve, cooler,)

10) SUPERCHARGING

- purpose of supercharging, supercharging systems used on marine engines
- turbosupercharger, main characteristics of turbo supercharging systems
- general information about supercharging problems
- air cooler (intercooler)
- purpose of waste-gate valve
- value of supercharging air pressure

11) STARTING ENGINE

- starting engine
- electrical starting
- pneumatic starting, pneumatic starting system components

12) ENGINE PERFORMANCE (PERFORMANCE PARAMETERS)

- engine horsepower: indicated horsepower and brake horse power
- mechanical efficiency
- working torque
- specific consumption
- engine curve
- steady state and unsteady state engine, engine working range
- engine thermic balance
- engine autonomy operation calculation

13) ENGINE GOVERNORS

- purpose of engine governor
- depressure types and mechanical centrifugal mass types engine governors
- hydraulic engine governor woodward types
- general information about new engine governor types

14) REVERSING RUN AND REDUCTION GEARS

- reversing run systems
- mechanical reverse gear
- mating clutches
- reduction gears
- variable blades propellers, principle of working, advantage and disadvantage results.

15) AUTOMATION PROPULSION SYSTEMS

- description and operation of simple PAS (propulsion automatic system)
- general information about naval automation; electronic components
- description of simple automation circuit
- automation failure and propulsion system results

16) BATTERIES

- buildings
- charge checkover and charge regulation
- periodic maintenance and periodic checkover

17) WATER JET PROPULSION

- water jet boat
- main components of water jet system and their operational maintenance

18) DEPURATORS

- main components and operation of centrifugal depurators
- diesel oil and lubrication oil depurators

Back to contents

SUBJECT 2 of 4

BOARD MACHINES

1) ANTIACCIDENTS AND MINOR MAINTENANCE

- Call back of antiaccident information with updating of law
- Using and preservation of compressed gas containers
- Air-compressed uses or high pressure system uses
- Tackle's manoeuvre
- Individual protective equipments description provided to crew members and their use
- Rules of management and control of board workrooms and personal in charge
- General safety rules about machinery equipments, electric and electronic circuits
- General rules of accident prevention for oxiacetylene welding

2) BILGE WATER AND SLUDGE DEPURATORS

- bilge water depurator :
  - call back of operation and control
  - maintenance bill-book as monograph and main failures
- sludge treatment device:
  - call back of operation and control
  - maintenance bill-book as monograph and main failures

3) HYDRAULIC MACHINES (PUMPS)

- Head
- Rules of pump conduction :
  - priming
  - cavitation
  - maximum height of suction
- Centrifugal pumps description
- Impeller-pumps and centrifugal impeller pumps description
- Volumetric pumps description
- Description of different devices to prevent pump leakage
- Coupling pump/engine and provided maintenance bill-book; main failures

4) OILDYNAMIC EQUIPMENTS

- Description of hydraulic steering engine system operation description: different types of rudder, call back of system scheme
- Wheelhouse: maintenance bill-book
- System operation description: capstains, winches and stabilyzers. Systems schemes
- Capstans and winches and stabilizer system: maintenance bill-book

5) AUXILIARY BOILERS FOR STEAM PRODUCTION

- Bono boiler: call back of system description
- Bono boiler: maintenance bill-book

6) FRESH WATER PRODUCTION ON BOARD

- "SCAM " evaporator: call back working principle, circuit and components
- Scam evaporator : rules of control
- Scam evaporator: maintenance bill-book; failure and re-establishment
- Ignition Bono-Scam
- Distillation apparatus Rochem: principle of operation, circuits and components
- Comparison between two production systems
- Distillation apparatus Rochem: rules of control
- Distillation apparatus Rochem: maintenance bill-book
- Distillation apparatus Rochem: failures and re-establishment

7) REFRIGERATOR SYSTEM FOR COLD STORAGE

Back to contents

- Refrigerating cycle
- Call back of running and components description
- Rules of control and adjustment
- Periodical maintenance bill-book
- Failures

8) AIR CONDITIONING SYSTEMS
- Air-conditioning, atmospheric air, absolute and relative humidity, dew point, air change
- Call back of running and components description. Direct and indirect expanded systems.
- Rules of control and adjustment
- Periodical maintenances bill-book
- Failures and re-establishment

SUBJECT 3 of 4

ELECTROTECHNOLOGY

1) DIRECT CURRENT
- Call back about concepts of power difference, current intensity, electric resistance, drop voltage
- Call back of main electrotechnical laws;
- Call back of electric power in direct current - Joule's law
- Real and ideal generators, series and parallel connection
- Workroom: using of universal analyzer toolkit for voltage measure, current intensity, resistance and continuity;
- Workroom: using of megaohmeter for the electric insulator measure of the electromachines-

2) ELECTROSTATICS
- Call back of condensers, condensers connection
- Call back about charge and discharge of the condensers

3) ELECTROMAGNETISM
- Call back of magnetism and electromagnetic fields
- Electromagnetic induction
- General information about main electric machines operation (transformer, alternator, asynchronous motor)

4) ALTERNATING CURRENT
- General information of alternating values
- Examination of resistance, capacity and inductance in the alternating current
- Law of Ohm in the alternating current
- Workroom: alternating current elementary circuits

5) BOARD ELECTRIC SYSTEM
- General information about electric board systems and electric net characteristics in use on board of ships
- Electric power distribution on board
- Overcharge and circuit breakers/Protection of electrical circuits
- Protection from earth failure (residual current devices) and meaning of selective protection
- Main antiaccidents rules

6) GENERAL INFORMATION OF SEMI-CONDUCTORS AND THE PN JOINT
- General, main property of semi-conductors, semiconductors devices, creation of the PN joint and its properties
- Real and ideal diode and graphic characteristics V/I

7) GENERAL INFORMATION OF ELECTRONICS
- Amplificators and main circuits

8) GENERAL INFORMATION OF AUTOMATIC ADJUSTMENT

Back to contents

- Blocks diagram, retroaction systems, regulators

SUBJECT 4 of 4

WORKROOM

1) TECHNOLOGY

- Deepenings and use of these measurement instruments:
  - callipers
  - micrometer
  - dial test indicator
  - iron surface plate
  - hand carbon tap, draw-die e screw pitch gage
- Termic treatments
- Alloyes
- UNAV nomenclature
- Reading technical plan
- Metal classifications

2) ELECTRIC AND OXIACETYLENE FLAME WELDING

- Welding types and their use
- Type of electrods and their choice
- Knowing different kinds of welding torch and reductor valves
- Deposit and cuttting technique
- Skill proof
- Safety rules

3) TURNING

- Illustration for characteristics of machines
- Skill proof

4) CONTRIVER

- Use of screw cutting
- Assemblage of ball-bearing

5) PLUMBERS

- Screw-cutting of pipe up to 4 inch size

Back to contents

Marine Engineering

COURSE TO OPERATE ENDOTHERMIC ENGINES UP TO 1000 HP ON BOARD NAVAL UNIT OF OTHER POLICE ARMED FORCES

Reference No
2.4

Duration
12 weeks

Frequency
One course each year

Course min/max number
Minimum 8

Accomodations
Board at school in barracks

Aim of course

To give the practical and theoretical background necessary to operate naval engines with power within 1000 HP and the background to operate and to service board machineries and systems.

Outline syllabus

Subjects

- Engines
- Naval Construction and board systems

Entry standards

- Able to swim.
- Intermediate school.

Examination

Written final exam on the subjects indicated above.

Remarks

At the end of the course, participants will get Certificate of Attendance.

Back to contents

2.4

INTRODUCTORY COURSE TO OPERATE ENDOTHERMIC ENGINES UP TO 1000 HP ON BOARD NAVAL UNIT OF OTHER POLICE ARMED FORCES - SYLLABUS

SUBJECT 1 OF 2

ENGINES – Hours 288

PART I (THEORY)

1) PHYSICS CALL BACK
- Definition of following physic quantities
  - mass
  - force
  - torque
  - work
  - power
- Meaning of pressure and its measurement
- Working torque-weight and specific mass-specific volume
- Technical and international systems of measurement

2) THERMODYNAMICS NOTIONS
- Meaning of heat and temperature
- Specific heat - heat transmission
- Temperature thermometric scales
- Conversion of heat in use; principle of equivalence
- Meaning of work produced by engine, meaning of efficiency

3) ENGINES
- Engine classification
- Reciprocating internal combustion structure of engine
- Geometric elements of engine; engine displacement and compression ratio calculation

4) DIESEL ENGINE
- Description of operation of 4 and 2 strokes diesel engines on ideal P-V axis
- Description of real operation of 4 and 2 strokes diesel engines
- Meaning of indicated medium pressure
- 4 strokes engines' time diagrams
- Comparison between 4 strokes diesel engines and 2 strokes diesel engines (general information)

5) COMBUSTION
- combustion reaction
- internal combustion engine, combustion reaction
- air-fuel ratio and combustion products
- meaning of "air feed"; meaning of "volumetric efficiency"
- diesel engine fuels and their characteristics; cetane number

6) FUEL INJECTION
- ignition delay and depending elements
- injection advance and its calculation (general information)
- direct and indirect mechanical injection; fuel system
- fast diesel engines, auxiliary combustion chambers, glow plugs
- introduction about injection advance automatic variator

Back to contents

7) LUBRICATION

- friction. lubrication's theory (general information)
- lubrication purpose
- forced lubrication
- operation of load bearings and thrust bearings
- lubrication oils and their characteristics
- engine lubrification circuit
- lubrification system defects
- oil sample tests

8) ENGINE COOLING

- purpose of engine cooling
- cooling systems
- sea water and fresh water circuits
- cooling system's main components
- fresh water's additive agents
- engine cooling systems' defects

9) ENGINE START

- general information about different type of starting systems
- defects of engine starting system

10) GENERAL INFORMATIONS ABOUT REVERSING RUN

- general information about mechanical and hydraulic reversing run systems
- general information about mating clutches and reduction gears

11) SUPERCHARGING

- purpose of supercharging
- supercharged diesel engines
- turbosupercharger and intercooler
- advantage and disadvantage of supercharging; precaution to follow for system control

12) ENGINE HORSE POWER

- definition of theoretical horsepower and brake horsepower
- engine power calculation
- elements which depend on engine power
- overload

13) FUEL COMSUMPTION

- cycle comsumption, comsumption per hour, specific comsumption
- elements which depend on comsumption
- engine autonomy operation calculation
- engine curve (power, torque, specific comsumption)

14) ENGINE GOVERNORS (GENERAL INFORMATION)

- engine speed governors
- centrifugal and hydraulic engine governors types

15) OTTO ENGINE

- operation of 4 strokes and 2 strokes otto engines
- otto engine's combustion reaction
- gasolines - knock rating - octane number
- defects of combustion
- otto engine's fuel supply
- carburation and carburators (general information)
- injection

16) TRANSMITTERS

- principle of operation of pressure switch, thermocouple, thermoresistor, tachometer

Back to contents

- engine transmitters application

17) ENGINE PROTECTION
- purpose and action of engine protections

PART II (PRACTICAL)

1) CALL BACK
- metals properties
- iron metals characteristics
- main types of metal alloy
- thermic treatments
- technology application in engines building

2) INSTRUMENTS OF MEASUREMENT
- description and employment of following instruments of measure: metre, caliper gauge, (the twentieth and inches type)
- micrometer gauge (the hundredth)
- thickness gauge; thread gauge
- dial gauge
- thermometer, pyrometer, manometer

3) WEAR MATERIALS
- identification of different wear materials
- building of water gasket, oil gasket, diesel oil gasket, compressed air gasket
- use of different types of packings
- use of emery paste; use of sealing compound

4) MECHANICAL TOOLS
- description and use of wrenches, hammer, chisel, screws, bolts, spines
- description of lapping valve machine tool

5) PARTS AND COMPONENTS OF ENGINE
- description and identification of engine's components
- main structural parts (crankcase, cylinders block, cylinders, cylinders heads)
- main moving parts (crankshaft, connecting rod, pistons , piston rings)
- thightening of cylinders heads
- thightening of bearings

6) TOLERANCE
- valves sealing surface test
- surface valves skimming and lapping
- piston rings extremity tolerance test, cylinders internal diameter measurement
- assembly of connecting rods and pistons
- crankcase bolts test and connecting rod bolts test
- rankshaft axial tolerance test
- cylinder head surface test

7) TIMING SYSTEM
- timing system components
  (camshaft, rocher arm, push rod, valves)
- engine valve tappets calibration
- rotation line search
- timing system timing
- ignition order check

Back to contents

8) FUEL INJECTION

- fuel circuit map
- direct and indirect injection
- technical description about multiple alternative injector pumps
- technical description about injectors and spray nozzles
- disassembly, maintenance and assembly of injection system components
- injectors and spray nozzles calibration
- injection pump timing on itself
- injection pump timing on engine and overflowing test
- injection advance automatic variator
- fuel feed pumps
- diesel oil filters
- general information about rotative injection pumps

9) ENGINE COOLING

- description of fresh water circuit
- description of sea water circuit
- disassembly, cleaning, assembly and pressing test of cooler
- thermostatic valve
- zinc anodes
- cooling circuits accessories
- cooling circuit cleaning

10) ENGINE LUBRICATION

- description of lubrication systems
- pressure and temperature's working value ; importance of working parameters checks
- identification of different types of lubrication oils
- gear pumps and screw pumps
- oil filters
- oil flash-point sample test and oil viscosity sample test

11) ENGINE START

- description of different types of engine starting systems
- electrical starter
- batteries. series and parallel batteries connection
- battery check status. charge and discharge

12) REVERSING RUN

- disassembly and assembly of Borg-Warner reduction gear
- description of variable blades propellers reversing system

13) SUPERCHARGING

- description of supercharging system
- disassembly and assembly of turbosupercharger
- turbosupercharger's maintenances and tests

14) ENGINE GOVERNORS

- mechanical centrifugal mass type engine governor
- hydraulic engine governor
- description of engine woodward type governor components
- engine governors' maintenances and tests

15) ENGINE RUN CONTROL

- engine pre-starting checks
- starting engine
- instruments control during motion
- rules to follow during engine pre-starting and engine run
- engine stops

Back to contents

16) ENGINE MAIN DEFECTS

- main injection system defects and their troubleshooting
- circuits leaks
- defects identification using engine instruments

SUBJECT 2 OF 2

NAVAL CONSTRUCTION AND BOARD SYSTEMS – Hours 120

1) MAIN STRUCTURES OF THE SHIPS

- Longitudinal structures of hull. Keel, Keelsons, girders and waterways
- Transversal structures of hull: floors, frames, beams, pillars, shell plating,, decks and superstructures

2) SHAPES OF HULL

- Longitudinal section plan, floating plan and floating shape
- Midship section
- Water line, beam line, camper of the beam
- Depth of bottom, high of construction
- Lenght and breadth of hull, draft, mean draft and draft scale

3) WATERTIGHT AND CELLS COMPARTMENTATION

- Bulkheads and watertight doors, maintenance and control of double bottom
- Peaks
- Maintenance of the hull structures

4) DISPLACEMENT, DEADWEIGHT AND TONNAGE

- Displacement and buoyancy, reserve of buoyancy,
- Free board, meaning of tonnage

5) GENERAL INFORMATION OF STABILITY

- Meaning of centre of gravity and metacentre
- Stability couple
- Elements that cause stability variation
- Behaviour of the ship changing stability

6) RUDDERS

- External actions on the rudder and theirs effects
- Steering engine
- Tiller rope helmstock and hydraulic helmstock, general information of hydraulic system; running and possible failures
- Emercency wheelhouse

7) HULL SERVICE

- Shaft lines
- Propeller shaft, stern gear, bottom appendages
- Sea cocks, sea exhaust and relative fittings

8) GENERAL ABOUT HYDRAULIC MACHINES (PUMPS)

- Head
- Rate of flow
- Volumetric, reciprocating and rotary pumps
- Centrifugal pumps
- Impeller-pump
- Comparison between different types of pumps
- Fans
- Pouring pumps, sanitary and drinking water

Back to contents

9) GENERAL INFORMATION ABOUT RUNNING OF COOLING EQUIPMENT

- Compression cooling cycle (blocks diagram)
- Compressor, condenser, evaporator, expansion valve
- Additional and auxiliary components
- Maintenance and precautions to take for running

10) CATODIC PROTECTION OF METAL MATERIALS

- Corrosion of materials
- Prevention and protection methods: metal bottom, wood bottom and resin-glass bottom
- Check consumption of zinc plates and efficiency of earth equipment
- Materials and specific paints (anticorrosion paint and antifouling paint)

11) DRYDOCK

- Survey and maintenance to bottom, to propeller shaft, to propeller and rudders during introduction in dry dock or putting ashore
- Rules of safety to comply with

12) SLUDGE TREATMENT EQUIPMENTS AND ANTIPOLLUTION RULES

13) ANTIFOULING DEVICES

14) DEPURATOR EQUIPMENTS OF BILGE WATER (GENARAL INFORMATION) AND ANTIPOLLUTION RULES

15) ELECTRICAL SYSTEM

- General information about electric board systems
- Characteristics of board electric systems
- Electricity generate and distribution on board
  - Characteristics of employed electric power
  - General information about principle of running of generators and electric motors
  - Main components of an electrical system (switches, fuses etc)
  - Ground outlet
- Main rules of safety and precaution to put in action

16) GENERAL OF ANTIACCIDENT RULES AND FIRE/ANTILEAK SAFETY

- Safety rules:
  - Precaution to take for painting and removing rust
  - Work at upper parts of superstructure (masts and funnels)
  - Work above scaffolding
  - Work with use of air-compressed and works on high pressure systems
  - Manoeuvres with swinging weights - tackles
  - Work in workroom
- Elements of fire prevention:
  - Safety team organization
  - Elements of fire
  - Fires classification
  - Estinguisher devices: H_2O, CO_2, Halon, foam, powder
  - Fixed and semi-fixed systems
  - Scheme and description of fire line
- Elements of overflowing prevention:
  - Watertight compartments
  - Exhaustion devices

Back to contents

Marine Engineering

COAST GUARD NAVAL UNITS ENGINE MANAGEMENT POWER WITHIN 2400 KW PER SHAFT.

Reference No
2.5

Duration
9 weeks

Frequency
One course per year

Course min/max number
Minimum 8

Accomodations
Board at school in barracks

Aim of course

To give Ratings up to Chief Petty Officers the practical and theoretical background necessary to manage engines on board naval units and the background to operate and service board machineries and systems.

Outline syllabus

SUBJECTS

- Engines
- Naval Construction and Board Systems
- Engine Management
- Conferences

Entry standards

- Must have Certificate of Abilitation to operate engines with power up to 800 kW per shaft on board Coast Guard naval units or licence of abilitation to operate Coast Guard naval engines with power up to 1000 HP.
- Must have worked in charge of engines on board Coast Guard naval units with any rank for at least five years, twelve months of which as an engine operator with the minimum rank of SGT, on board Coast Guard naval units with power up to 450 kW per shaft.

Examination

Oral final exam on all subjects.

Remarks

At the end of the course, participants will get a Certificate of Attendance.

Back to contents

2.5

COAST GUARD NAVAL UNITS MANAGEMENT POWER UP TO 2400 KW PER SHAFT - SYLLABUS

SUBJECT 1 OF 4

ENGINES – Hours 152

PART I (THEORY)

1) PHYSICS AND THERMODYNAMICS CALLS BACK
- systems of unit measure, physics quantities
- heat and temperature, specific volume, absolute and relative pressure, heat transmission.
- first and second thermodynamics laws
- ideal gases transformation
- thermodynamics cycles
- meaning of cycle efficiency
- Graphic work performance on PV axis

2) DIESEL ENGINE
- engines classification and reciprocating internal combustion engines' structure calls back
- principle of operation of 4 strokes and 2 strokes diesel engines
- diesel engines ideal cycle
- Sabathè ideal cycle and its efficiency
- 4 strokes and 2 strokes engines actual cycle

3) DIESEL ENGINES COMBUSTION
- combustion reaction
- diesel engines combustion reaction, stoichiometric ratio, necessary combustion reaction's air, injection delay
- injection advance and its calculation
- consideration about exhaust gases temperature
- defects of diesel engine combustion
- liquid fuels and their characteristics
- fuel system and its parts
- fuel management on board of ships

4) TIMING SYSTEM
- timing system components
- 4 strokes diesel engine time diagram

5) FUEL INJECTION
- Bosh type injector pump
- fuel injectors and fuel spray nozzles
- fast diesel engine problems
- auxiliary combustion chambers and their working
- Glow plugs
- new injection systems (common rail system)

6) OTTO ENGINE

principle of operation of 4 strokes and 2 strokes otto engines
- ideal otto cycle and its efficiency
- 4 strokes and 2 strokes engines' actual otto cycle
- otto engine's combustion reaction
- gasolines and their properties
- combustion's defects (preinjection, self-injection, detonation)
- 4 strokes and 2 strokes otto engines' time diagram

Back to contents

7) OTTO ENGINE INITION

- distributor injection system
- general information about electronic injection.
- spark plugs

8) ENGINE LUBRICATION

- lubrication purpose
- operation of load bearings and thrust bearings
- lubrication oil characteristcs
- SAE classification and lubrication systems
- lubrication circuit's main components (oil pump, filters, thermostatic valve, cooler, centrifugal filter)

9) ENGINE COOLING

- purpose of engine cooling
- coolants
- cooling systems
- open system and close system
- cooling system's components (pump, thermostatic valve, cooler)

10) SUPERCHARGING

- purpose of supercharging
- supercharging systems used on marine engines
- turbosupercharger
- main characteristics of turbo supercharging systems
- general information about supercharging problems
- air cooler (intercooler)
- purpose of waste-gate valve
- value of supercharging air pressure

11) STARTING ENGINE

- starting engine
- electrical starting
- pneumatic starting
- pneumatic starting system circuit

12) ENGINE PERFORMANCE (PERFORMANCE PARAMETERS)

- engine horsepower: indicated horsepower and brake horse power
- mechanical efficiency
- working torque
- specific fuel consumption
- engine curve
- steady state engine and unsteady state engine
- engine operation range
- engine thermic balance
- engine autonomy operation calculation

13) ENGINE GOVERNORS

- purpose of engine governor
- depressure types and mechanical centrifugal mass types engine governors
- hydraulic engine governor woodward types
- general information about new engine governor types

14) REVERSING RUN AND REDUCTION GEARS

- reversing run systems
- mechanical reversing gear
- mating clutches
- reduction gears
- variable blades propellers
- principle of working of variable blades propellers, advantage and disadvantage results.

Back to contents

15) PROPULSION SYSTEMS AUTOMATION

- description and operation of simple PAS (propulsion automatic system)
- general information about naval automation; electronic components
- description of simple automation circuit
- Automation failure and propulsion system results

16) BATTERIES

- buildings
- charge checkover
- charge regulation
- periodical maintenance and periodical checkover

17) WATER JET PROPULSION

- water jet boat
- main components of water jet system and their operational maintenance

18) DEPURATORS

- main components and operation of centrifugal depurators
- diesel oil and lubrication oil depurators
- bilge water depurators

PARTE II (PRACTICAL)

1) USE OF WORKING TOOLS AND MEASURE INSTRUMENTS

2) DESCRIPTION OF PARTS OF ENGINE

3) TRAINING ABOUT DISASSEMBLY AND ASSEMBLY OF ENGINE'S COMPONENTS

- test and check about timing system components
- timing system timing
- engine valve tappets calibration
- defects of timing system

4) TESTS AND CALIBRATION OF INJECTOR PUMP BOSH TYPE

- disassembly, calibration and assembly of injectors
- injection pump timing on itself and injection pump timing on engine
  tests and maintenance about fuel system
- operational defects of high pressure fuel circuit and low pressure fuel circuit
- Woodward type engine governor's maintenances and adjustments

5) TESTS AND MAINTENANCE OF LUBRIFICATION SYSTEMS AND COOLING SYSTEMS

- fresh water circuit and sea water circuit's defects
- cooling system components' fixing operations (pumps, filters, valves, coolers, thermostatic valve, zinc anodes)
- defects of lubrication system
- lubrication system components' fixing operations (pump, filters, pressure regulating valve, coolers, thermostatic valve)

6) DEFECTS, TESTS AND MAINTENANCE OF ELECTRICAL STARTER

7) TESTS AND MAINTENANCE ABOUT PNEUMATIC STARTING SYSTEM COMPONENTS AND PNEUMATIC STARTER

8) TESTS AND MAINTENANCE ABOUT SUPERCHARGING SYSTEM COMPONENTS

- disassembly and assembly of turbosupercharger, waste-gate valve, air cooler.
- cleaning of turbosupercharger's compressor

9) TESTS, MAINTENANCE AND ADJUSTMENT OF REVERSING GEAR

Back to contents

10) TESTS AND MAINTENANCE OF CENTRIFUGAL OIL AND DIESEL OIL DEPURATOR
- Defects of depurator and troubleshooting

11) TESTS, MAINTENANCE AND ADJUSTMENT OF STARTING SYSTEM

12) ENGINE SET-UP BEFORE STARTING
- engine pre-starting checks
- engine stop

13) TRAINING ON REGULAR RUNNING ENGINE (WORKING PARAMETERS CHECKS DURING MOTION) - TESTS AND CHECKS TO PERFORME DURING ENGINE CONTROL

14) DAILY AND PERIODICAL ENGINE'S MAINTENANCE
- preventive maintenance
- Italian Coast Guard General Commander's rules/specification about efficiency
- predicting maintenance (vibrations check)

15) TESTS AND MAINTENANCE ABOUT CLUTCHES/REDUCTION GEARS/SHAFTS/PROPELLERS

16) STORING AND UPDATING OF PLANTS AND MACHINERIES' LOOG-BOOKS

SUBJECT 2 OF 4

NAVAL CONSTRUCTION AND BOARD SYSTEMS – Hours 64

1) CHARACTERISTICS OF MERCHANT SHIPS – CALLS BACK OF BUOYANCY AND SEAWORTHINESS
- Archimede's principle : displacement, buoyancy, reserve of buoyancy, tonnage, free board, free board marking;
- Surveillance's Institute and classification of the ships;
- Class certificate;
- Control and testing.

2) MAIN STRUCTURES OF HULL
- Longitudinal and transversal structures;
- Decks and superstructures.

3) SHAPES OF HULL
- Centre line;
- Floating plane;
- Midship section;
- Waterline;
- Beamline;
- Round of the beam;
- Depth of bottom;
- High of construction;
- Lenght and breadth of the hull.

4) WATERTIGHT AND CELL COMPARTMENTATION
- Watertight bulkheads;
- Watertight doors;
- Maintenance and control of double bottoms;
- Peaks;
- Hull's structure maintenance

5) DRAFT MARKS
- Draft;
- Mean draft;
- Draft marks;

Back to contents

- Graphic representation and reading of different draft marks.

6) DOCKS
- Dry dock and floating dock;
- Ship in dry dock: precautions for entrance, staying and outgoing;
- Survey and maintenance to bottom, propeller shaft, propellers and rudders.

7) STEERING GEAR.
- Positioning, shape and dimension of rudders;
- Structure of rudders;
- Rudder effects;
- Steering gear: equipment's scheme;
- Running of steering gear;
- Auxiliary and emergency arrangement of a steering gear;
- Maintenance.

8) REFRIGERATOR EQUIPMENT AND COMPRESSORS
- General information of a refrigerator equipment: composition and working;
- Air-compressors: principle of running, rules of conduct and maintenance;
- Condensers, evaporators.

9) CAPSTANS AND WINDLASS
- Electromechanical equipments, electrohydraulic capstans and windlass, running and maintenance.

10) PUMPS AND PIPELINE – HULL SERVICE
- Main types of pumps;
- Pipeline;
- Maintenance and control.

11) ANTIACCIDENT
- Antiaccident laws;
- Signals and individual protection devices

12) BOARD'S SAFETY SERVICE AND SAFETY EQUIPMENTS
- Organization and safety service duties
- Anti-fire service: layout and devices;
- Anti leak and exhaustion service: layout and devices

13) TRASVERSAL STABILITY
- Stability diagrams
- Vertical shifting of weight
- Stability
- Cases and consequence of heeling
- Pending weights: effects on stability
- Liquid cargo and free surface: stability effects
- Loading and discharging of weights, general effects on stability and trim
- Dynamic effect of a bending moment: angle of dynamic balance

14) LONGITUDINAL STATIC STABILITY
- Elements of longitudinal static stability
- Longitudinal shifting of weights: effects on stability and trim

15) GENERAL ABOUT RUNNING OF SLUDGE TREATMENT EQUIPMENT AND DEPURATOR OF BILGE WATER EQUIPMENT

16) PARASITIC CURRENTS: NATURE, RECURRENT CAUSES, MEASUREMENT, DEVICES FOR THEIR ABSORPTION (PASSIVE AND ACTICE PROTECTION)

17) GENERAL ABOUT PRODUCTIONING OF FRESH WATER- PRINCIPLE OF REVERSE OSMOSIS PLANTS

Back to contents

SUBJECT 3 OF 4

ENGINE MANAGEMENT – Hours 18

1) DUTIES AND RESPONSABILITY OF CHIEF ENGINEERING

2) ORGANIZATION, EFFICIENCY AND OPERATIVE RESTRICTION. TAKING OVER.

3) GENERAL INFORMATION ABOUT MARPOL

4) GENERAL INFORMATION CONCERNING ITALIAN LAWS ON MARINE POLLUTION (979/82 SEA DEFENCE, ITALIAN COAST GUARD GENERAL COMMANDER'S RULES, NORMATIVE ABOUT PROTECTED SEA AREAS)

5) ANTIPOLLUTING TECHNIQUES (CONFINEMENT, CONTAINMENT, REMOVAL WITH ANALISYS OF DIFFERENT TYPES OF INTERVENTION AS MECHANIC CLEANSING, ABSORBING, SPREADING AND BURNING)

6) GENERAL INFORMATION ABOUT CIVIL RESPONSABILITY IN CASE OF MARINE POLLUTION

SUBJECT 4 OF 4

CONFERENCE - Hours 3

1) MATERIAL MANAGEMENT AND ADMISTRATIVE PROCEDURES

Back to contents

Marine Engineering

INTRODUCTORY COURSE FOR ENGINE OPERATORS ABOVE 3500 KW PER SHAFT

Reference No
2.6

Duration
3 weeks

Frequency
One course per year

Course min/max number
Minimum 8

Accomodations
Board at school in barracks

Back to contents

Aim of course

To examine closely and to complete the specialist background, the practical training and the knowledge of the administrative laws necessary to perform job of engine operator, on board units with engines powered above 3500 Kw per shaft.

To prepare and to train Engine Chief Petty Officers so that, at the end of the course, they meet the following requirements:

- Qualified to operate and service endothermic engines, propulsion machineries, the hull and the auxiliary systems on board coast naval units;
- Qualified to service and repair machineries;
- Qualified to work as engine store keeper.

Outline syllabus

SUBJECTS

- OPERATING ENGINES
- BOARD SYSTEMS
- SPARE PARTS MANAGEMENT
- ORGANIZATION ENGINEER DUTY
- USE OF PERSONAL COMPUTER

Entry standards

- Must have certificate of abilitation to operate engines with power up to 3500 kW per shaft.
- Must have worked in the engine duty on board ships with engine superior to 3500 Kw, as petty officer responsible, for at least 18 months

Examination

Written final exam on the subjects indicated above.

Remarks

At the end of the course, participants will get a Certificate of Attendance.

2.6

INTRODUCTORY COURSE FOR ENGINE OPERATORS ABOVE 3500 KW PER SHAFT - SYLLABUS

SUBJECT 1 OF 5

OPERATING ENGINES

1) CONFIGURATION OF PROPULSION PLANTS
- Typical plant configuration, including production and distribution of the electrical power
- Main engines, mating clutches, shafts, propellers, bow thruster

2) EQUIPMENT'S CHARACTERISTICS, PROCEDURE TO PLAN AND PERFORME MAINTENANCES
- Main diesel engine type ISOTTA- FRASCHINI ID 386 8 V cylinder supercharged (with operational test)
- Mating clutches, reduction and reversing gear
- Shafts, shaft seal, propeller
- Starting tests and engine control on board
- Variable blades bow thruster propeller powered by electric-hydraulic engine
- FIAT AIFO 828M diesel generator
- Oil and diesel oil electrical depurator

3) AUTOMATION
- Propulsion automatic system (PAS)
- Plants'safety devices operation

4) ENGINE CONTROL WITH AUTOMATION FAILURE
- Power plant's most frequent failure identification
- Power plant control / running failure equipments
- Main Engines overload (single shaft running, towing, manual control, etc.)

5) PLANT FAILURE REPORT MESSAGE DESCRIPTION AND IMPORTANT DAMAGE REPORT

6) TECHNICAL PUBLICATION
- Analysis of technical publications and their different sections
- Comment (and practical training) of the following steps:
  - Substitution of a cylinder head
  - Cleaning of the turbosupercharged
  - Substitution of a cylinder
  - Timing system

7) ORDERS
- engine set-up and engine deset-up
- fuel and oil Orders management (comprehensive of the fireproof and antipollution precaution)
- Posting / updating orders on the machineries, orders for machine monitor
- orders for every duty

SUBJECT 2 OF 5

AUXILIARY SYSTEMS

Cooling

1) THEORETICAL RECALL ABOUT COOLING THECHNIQUE
- State fluid transformation and heat transmission
- Saturated vapors' compression refrigerator cooling cycle and their blocks diagram

Back to contents

2) COMPRESSION REFRIGERATOR COOLING PLANTS

- Major and auxiliary components
- Maintenance bill-book

3) MAIN APPLICATIONS OF COOLING TECHNIQUE

- Refrigerators:
  - Air conditioning. Purpose, ways of thermic exchange in the direct and centralized expansion plants
  - Air conditioners, refrigeration console, air diffusers, ventilation pipe, (with specific precaution about fireproof safety)
- Study and critical comment of the technical publications
- Identification and analysis of system failure
- Plants starting and control

Hydraulic plants

1) GENERALITY OF THE HYDRAULIC POWER GROUPS

- Main characteristics of hydraulic plants and hydraulic oils
- Common symbols used on hydraulic plant diagrams

2) STUDY AND CRITICAL COMMENT ABOUT PELLEGRINI HYDRAULIC CRANES- TECHNICAL PUBLICATION

- Plants' components
- Planned maintenance and troubleshooting
- Training on starting and control

3) HELM PLANTS AND CAPSTANS

- Helm's plant description
- Description of anchor winch and mooring capstans
- Capstans working tests
- Helm plants, normal and emergency tests

Water treatment

1) INTRODUCTION

- Marine pollution and polluting substances: general information
- Bilge water treatment: general information
- Biological water treatment: general information

2) ISIR PLANTS

- Study and critical comment about clorine plant, MINIECOLCELL type, technical publication
- Maintenance and failure research
- Starting and plant control

Conclusion

1) HULL PLANTS FAILURE REPORT MESSAGE DESCRIPTION AND IMPORTANT DAMAGE REPORT

SUBJECT 3 OF 5

SPARE PARTS MANAGEMENT

1) SUBJET IN CHARGE IN SPARE PARTS MANAGEMENT

- Captain's attributions
- Chief of Administrative Service's attributions
- Chief Supply Officer's attributions

2) STOREKEEPER: ATTRIBUTIONS AND TASKS

- Custody Storekeeper

Back to contents

- Supervision Storekeeper
- Storekeeper's tasks
- Storekeeper's assistants

3) MOVEMENT OF SPARE PARTS
- Supplies introduction in the depot
- Exit of spares from the depot
- Materials transformation

4) DEPOT
- Shipyard's depot
- Navy depot

SUBJECT 4 OF 5

ENGINEER DUTY ORGANIZATION

1) HIERARCHICAL STRUCTURE OF DEPENDENCE
- Maritime Department's organization chart
- Operation office: function
- Fleet's efficiency office: function

2) SHIPYARDS
- Organization chart
- Attributions

3) REGULATIONS
- Chief Engeneer's attribution and responsability
- Periodical and occasional documents
- Careening: predisposition and orders

SUBJECT 5 OF 5

USE OF PERSONAL COMPUTER

1) INTRODUCTION TO PERSONAL COMPUTER
- Personal Computer blocks diagram
- Mass memories
- Connection between central units and peripheric units (serial bus, parallel bus, PS/2, USB, SCSI)

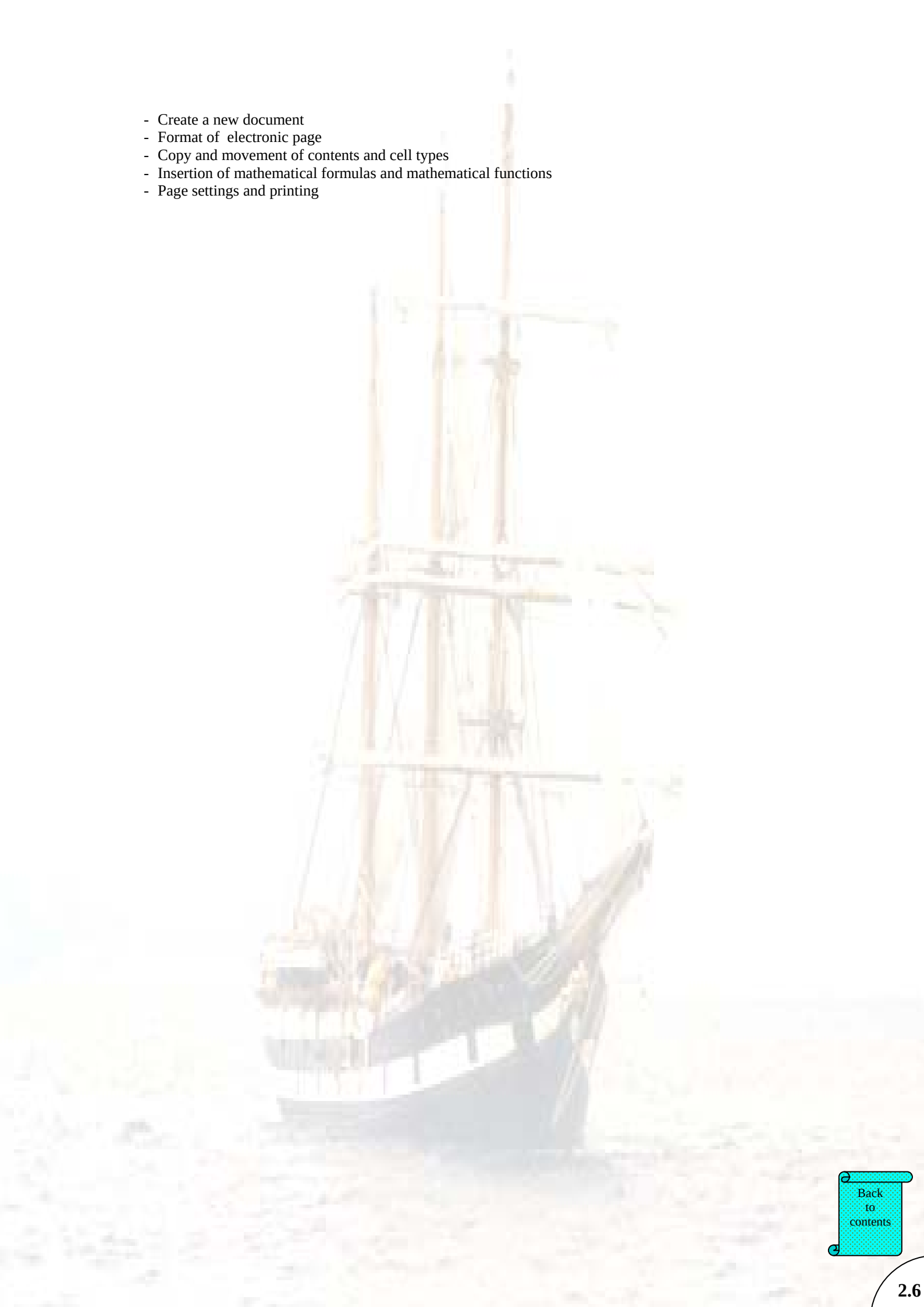
2) WINDOWS
- Introduction and main characteristics:
  - Control panel
  - Search and visualization of pc resource
  - Folders and file organization (resource management)
  - Hierarchy PC structure navigation (Explorer)

3) INTRODUCTION TO WORD FOR WINDOWS
- Introduction and main characteristics:
  - Create a new document
  - Open and modify an existing document
  - Format of characters, paragraphs, sections and pages
  - Cut, copy, paste and text shift

4) EXCEL FOR WINDOWS
- Introduction and main characteristics of electronic page:

Back to contents

- Create a new document
- Format of electronic page
- Copy and movement of contents and cell types
- Insertion of mathematical formulas and mathematical functions
- Page settings and printing



Back to contents